

## Curriculum Vitae Ainara Aguadero, PhD

I am a Reader in Energy Materials at the Department of Materials, Imperial College London. So far, I have succeeded securing *research funding up to €3,3M as PI* including funding for the development of a unique surface analysis technique “*High Five*” (£1.725M, EPSRC Strategic equipment grant EP/P029914/1). Since my appointment in March 2015 at Imperial College London, I have built up my own research group that counts with 4 post-doctoral researchers 1 research officer and 6 PhD students. My research focuses on the study of physical and chemical properties in complex oxides, bulk surfaces and interfaces for application in *solid state electrochemical devices* such as batteries, fuel cells and electrolyzers. At the moment I am involved in 9 projects including H2020 and UK funding plus 2 Spanish government grants as PI or CoI (>£35M) in this area.

### Qualifications

**PhD in Applied Physical Chemistry** Viva: 16<sup>th</sup> December 2006, Universidad Autónoma de Madrid (Spain) “*K<sub>2</sub>NiF<sub>4</sub> materials as cathodes for intermediate temperature solid oxide fuel cells*” *Outstanding Summa Cum Laude*

**Advanced studies diploma in Material Science** Sep 2005, Universidad Complutense de Madrid (Spain), “*Neutron diffraction study of the La-Ni-Cu-O system*”

**Master’s degree in chemistry**, speciality in Materials Science May 2002, Universidad Complutense de Madrid (Spain)

### Academic positions

**Reader in Energy Materials**- September 2020- Present Department of Materials, Imperial College London (London, UK)

**Senior Lecturer in Materials**- September 2018-September 2020, Department of Materials, Imperial College London (London, UK)

**Lecturer in Materials**, March 2015-September 2018, Department of Materials, Imperial College London (London, UK)

**Marie Curie Intra-European Fellow**, March 2013- March 2015, Department of Materials, Imperial College London (London, UK) “*New concepts in ceramic conducting oxides for improved energy storage devices*”

**Coordinator of Solid Electrolyte group**—March 2012- Feb 2013, CIC Energigune (Vitoria, Spain) “*Ceramic electrolytes for secondary batteries*”

**Academic visitor (Jose Castillejo Fellow)** Feb 2011-Aug 2011 and Oct 2011-Feb 2012, Department of Materials, Imperial College London (London, UK) “*Reversible solid oxide fuel cell-solid oxide electrolyzers*”

**Juan de la Cierva Fellow**— Feb 2009-Feb 2012, Instituto de Ciencia de Materiales de Madrid (CSIC) (Madrid, Spain) “*Development of new materials for energy conversion and storage: solid oxide fuel cells and metal hydrides*”

**Postdoctoral Researcher** — Jan 2007-Jan 2009, Centro de Investigaciones Energéticas Medioambientales y Tecnológicas (Madrid, Spain) “*Program for the exploitation and optimization of the regional energetic sources of Madrid Community through the validation of Fuel Cell Technology (SOFC and PEM)*”

**PhD FPI Fellow**— Feb 2003-Dec 2006, Centro de Investigaciones Energéticas Medioambientales y Tecnológicas (Spain) “*K<sub>2</sub>NiF<sub>4</sub> materials as cathodes for Intermediate Temperature Solid Oxide Fuel Cells*”

**Research visitor**-Jul 2003-Feb 2003, Chemistry Department Aarhus University (*Aarhus, Denmark*) "*Microporous single-crystal Materials*"

### **Active Research funding and awards**

**Horizon 2020 FETPROACT-2018-2020 "HARVESTORE"** 824072 (€7M) Consortium of 11 partners. Coordinator is Dr Albert Tarancón. I am the PI from Imperial College. Starting date 01/12/2018, duration 60 months.

**Faraday Challenge** "Towards a Comprehensive Understanding of Degradation in EV batteries" FIRG001. The Faraday Institution has been funded to promote the development of battery technology for electrified transport. We won the above-mentioned challenge forming a consortium with 9 University in the UK. The leader of the consortium is Prof. Clare Grey, University of Cambridge and I am a CoI from Imperial (£9.86M). Starting date 01/02/2018, duration 36 months with possibility of extension

**EPSRC ICSF** "Genesis: garnet electrolytes for new energy storage integrated solutions" EP/R024006/1 3 project partners, the leader is Prof. Peter Slater from Birmingham University, I am PI from Imperial (£ 754,4k). Starting date 01/10/2017, duration 36 months

**EPSRC ICSF** North East Centre for Energy Materials research hub EP/R023581/1. Consortium with 16 CoI from different UK Universities, the PI is Dr. Charles Monroe, I am CoI (£1.8M). Starting date 01/10/2017, duration 42 months

**EPSRC Platform grant** "Understanding the critical role of interfaces and surfaces in energy materials" EP/R002010/1 Platform for postdoc development in the area of Energy. PI Prof. Stephen Skinner, I am CoI (£1.3M). Starting date 01/10/2017, duration 60 months.

**EPSRC Strategic Equipment** "High Five: Resolution, Sensitivity, in operando Control, Ultra High Vacuum and Ion Sectioning in a Single Instrument" EP/P029914/1, This is a grant to build novel, beyond state-of-the-art strategic equipment, I am the PI of a consortium with 11 investigators (£1.725M). Starting date 13/09/2017, duration 36 months.

**EPSRC JSPS Core to Core Core** "Solid Oxide Interfaces for Faster Ion Transport (SOIFIT)" EP/P026478/1. Bilateral consortium between UK and Japan with added external collaborators from MIT (USA) and PSI (Switzerland). The PI is Prof. Stephen Skinner, I am one of the CoI from the UK side (£1M). Starting date 1<sup>st</sup> June 2017, duration 60 months

**EPSRC Supergen Energy Storage Challenge** "Next Generation solid state Lithium Batteries" EP/P003532/1 Consortium between Cambridge, Oxford and Imperial College. The lead is Cambridge with Prof. Clare Grey, I am the PI from Imperial College (£1.74M). Starting date 01/12/2016, duration 36 months

**EPSRC Standard Research** "Multi-scale analysis for facilities for energy storage (Manifest)" EP/N032888/1. This is a big consortium with 33 co-investigators, The PI is Dr. D. Radcliff. I am one of the CoIs at Imperial College (£4.01M). Starting date 30/09/2016, duration 48 months.

### **Previous research funding and awards**

**First Research Grant EPSRC** "Selective ion-conductive ceramic electrolytes" Grant for early academics within 3 years of their first academic position, PI (£120k). Starting date 01/07/2016, duration 12 months

**MIT-Imperial Seed Fund** "Control of Interfaces for Increasing the Power Density and Durability of Solid-State Batteries" Bilateral project to promote collaboration between MIT (USA) and Imperial college (UK), PI (£34.85k). Starting date 01/10/2016, duration 24 months

**EPSRC Supergen Fuel Cells Challenge** "Control of structure, strain and chemistry: a route to designer fuel cell interfaces" CoI (£1M). Starting date: 01/04/2015, duration 48 months.

**UK Catalysis Hub** "In-situ Probing Structure and Electronic Properties of Transition Metal Oxide Electrocatalysts" Hub with different UK universities CoI (£490k) starting date 01/02/2016, duration 24 months

**EPSRC Capital for Great Technologies** “Advanced Materials, Robotics and Autonomous Systems and Grid-scale Energy Storage” Big consortium with several universities in the UK to acquire equipment (obtained £156k)

**Marie Curie Intra-European Fellowship** March 2013-Feb2015 FP7-PEOPLE-2012-IEF, European Commission (€221.6k)

**Juan de la Cierva fellowship** for young researchers—2009-2012 Spanish Ministry of Science and Innovation (€99k)

**José Castillejo fellowship** for the mobility of young researchers, Spanish Ministry of Science and innovation (€29.5k)

**Madrid community ENERCAM-CM S-0505/ENE/0304 PI** Dr. Rita Valenzuela, CoI (€55k)

**CIEMAT FPI fellowship PhD** student research grant—2003-2006, Spanish Ministry of Science and innovation (€60k)

**PI** in 14 successful proposals for beam time in European facilities (ILL, PSI, ESRF, ISIS, DIAMOND) (~12.000 €/day)

**Named researcher in 7 Research Programs** funded by the Spanish Government and the European Community.

### Industrial engagement

I have three studentships partially funded by *Shell*, *Ceres Power* and *LiNa Energy* through iCASE (EPSRC funding with industrial partner) and Centre for Doctoral Training for Advanced Characterisation of Materials programs.

### Scientific production summary

**69 papers** in specialized journals plus 14 refereed proceeding contributions with over **2.5k citations**, h index of 29, i10=46.

**95 conference and workshops** contributions within the field of materials and energy (25 invited 4 plenary/keynote talks, 6 chairing sessions), 3 organisation of international symposiums.

**105 entries** in the Inorganic Crystal Structure Database (ICSD)

**United States patent** number 8575387, Granted: Nov 5<sup>th</sup>, 2013 “Method for preparing carboxylic acids”

### Publications in peer-reviewed scientific journals: AUTHORS (in order of authorship)

\*corresponding author, number of citations above 10 are indicated (*i10-index* : 39)

1- A. Agüadero\*, M. Pérez, J.A. Alonso, L. Daza “Neutron powder diffraction study of the influence of high oxygen pressure treatments on  $\text{La}_2\text{NiO}_{4+\delta}$  and structural analysis of  $\text{La}_2\text{Ni}_{1-x}\text{Cu}_x\text{O}_{4+\delta}$  ( $0 \leq x \leq 1$ )” *Journal of Power Sources*, 151, 52-56, 2005. Cited by 38

2- A. Agüadero\*, J.A. Alonso, M.J. Martínez-Lope, M.T Fernández-Díaz, M.J. Escudero, L. Daza “In situ high temperature neutron powder diffraction study of oxygen-rich  $\text{La}_2\text{NiO}_{4+\delta}$  in air: correlation with the electrical behaviour” *Journal of Materials Chemistry*, 16, 3402-3408, 2006. Cited by 80

3- A. Agüadero\*, M.J. Escudero, M. Pérez, J.A. Alonso, V. Pomjakushim, L. Daza “Effect of Sr content on the crystal structure and electrical properties of the system  $\text{La}_{2-x}\text{Sr}_x\text{NiO}_{4+\delta}$ ” *Dalton Transactions*, 4377-4383, 2006. Cited by 44

4- A. Agüadero\*, J. A. Alonso, M. T. Fernández-Díaz, M. J. Escudero and L. Daza “In situ high-temperature neutron diffraction study of oxygen-rich  $\text{La}_2\text{Ni}_{1-x}\text{Cu}_x\text{O}_{4+\delta}$  in air: correlation with the electrical behaviour” *Journal of Power Sources*, 169, 17-24, 2007. Cited by 33

5- A. Agüadero\*, M.J. Escudero, M. Pérez, J.A. Alonso, L. Daza “Hyperstoichiometric  $\text{La}_{1.9}\text{Sr}_{0.1}\text{NiO}_{4+\delta}$  mixed conductor as novel cathode for intermediate temperature solid oxide fuel cells” *Journal of Fuel Cell Science and Technology*, 4, 294-298, 2007. Cited by 31

- 6- M. J. Escudero\*, A. Aguadero, J.A. Alonso, L. Daza, "A kinetic study of oxygen reduction on  $\text{La}_2\text{NiO}_4$  cathodes: Impedance spectroscopy" *Journal of Electroanalytical Chemistry*, 611, 107-116, 2007. Cited by 264
- 7- A. Aguadero\*, C. de la Calle, J. A. alonso, M. J. Escudero, M. T. Fernandez-Díaz, L. Daza "Structural and electrical characterization of the Novel  $\text{SrCo}_{0.9}\text{Sb}_{0.1}\text{O}_{3-\delta}$  perovskite: Evaluation as a solid oxide fuel cell cathode material" *Chemistry of Materials*, 19, 6437-6444, 2007. Cited by 74
- 8- J.A. Alonso\*, M.J. Martínez-Lope, A. Aguadero, L. Daza "Neutron diffraction as a characterization tool for fuel cell materials" *Progress in Solid State Chemistry*, 36, 134-150, 2008. Cited by 18
- 9- D. Perez-Coll\*, A. Aguadero, M. J. Escudero, P. Nuñez, L. Daza "Optimization of the interface polarization of the  $\text{La}_2\text{NiO}_4$ -based cathode working with the  $\text{Ce}_{1-x}\text{Sm}_x\text{O}_{2-\delta}$  electrolyte system" *Journal of Power Sources*, 178, 151-162, 2008. Cited by 85
- 10- A. Aguadero\*, J. A. Alonso, M. J. Escudero, L. Daza "Evaluation of the  $\text{La}_2\text{Ni}_{1-x}\text{Cu}_x\text{O}_{4+\delta}$  system as SOFC cathode material with 8YSZ and LSGM as electrolytes" *Solid State Ionics*, 179, 393-400, 2008. Cited by 137
- 11- A. Aguadero\*, J.A. Alonso, L. Daza "Oxygen Excess in  $\text{La}_2\text{CoO}_{4+\delta}$ : A Neutron Diffraction Study" *Zeitschrift fur Naturforschung B*, 6, 615-622, 2008
- 12- C. de la Calle\*, A. Aguadero, J.A. Alonso, M.T. Fernández-Díaz "Correlation between reconstructive phase transitions and transport properties from  $\text{SrCoO}_{2.5}$  brownmillerite: a neutron diffraction study" *Solid State Science*, 10, 1924-1935, 2008. Cited by 92. Cover page of this issue
- 13- A. Aguadero\*, C. de la Calle, D. Perez-Coll, J.A. Alonso "Structure, thermal stability and electrical properties of  $\text{Ca}(\text{V}_{0.5}\text{Mo}_{0.5})\text{O}_3$  as solid oxide fuel cell anode" *Journal of Power Sources*, 192, 78-93, 2009. Cited by 33
- 14- A. Aguadero\*, D. Pérez-Coll, C. de la Calle, J.A. Alonso, M.J. Escudero, L. Daza "SrCo $_{1-x}$ Sb $_x$ O $_{3-\delta}$  perovskite oxides as cathode materials in solid oxide fuel cells" *Journal of Power Sources*, 192, 132-137, 2009. Cited by 93
- 15- D. Pérez-Coll\*, A. Aguadero, M.J. Escudero, L. Daza "Effect of DC current polarization on the electrochemical behaviour of  $\text{La}_2\text{NiO}_{4+\delta}$  and  $\text{La}_3\text{Ni}_2\text{O}_{7+\delta}$ -based systems" *Journal of Power Sources*, 192, 3-12, 2009. Cited by 49
- 16- C. de la Calle, J.A. Alonso\*, A. Aguadero, M.T. Fernández-Díaz "Phase transformations in  $\text{Sr}_{0.8}\text{Ba}_{0.2}\text{CoO}_{2.5}$  brownmillerite: Correlation between structure and transport properties" *Dalton Transactions*, 4104-4114, 2009. Cited by 12
- 17- J. Soler\*, J. Lemus, M.P. Pina, J. Sanz, A. Aguadero, J.A. Alonso "Evaluation of the Pyrochlore( $\text{H}_3\text{O}$ )  $\text{SbTeO}_6$  as a Candidate for Electrolytic Membranes in PEM Fuel Cells" *Journal of New Materials for Electrochemical Systems*, 12, 77-80, 2009
- 18- D. Pérez-Coll\*, A. Aguadero, M. J. Escudero, L. Daza "Electrochemical behavior of  $\text{La}_2\text{Ni}_{0.6}\text{Cu}_{0.4}\text{O}_{4+\delta}$  oxide on SDC electrolyte as cathode for IT-SOFC" *ECS Transactions* 25, 2589-2596, 2009
- 19- A. Aguadero\*, J.A. Alonso, D. Pérez-Coll, C. de la Calle, M.T. Fernández-Díaz, J. B. Goodenough "SrCo $_{0.95}$ Sb $_{0.05}$ O $_{3-\delta}$  as Cathode Material for High Power Density Solid Oxide Fuel Cells" *Chemistry of Materials*, 22, 789-798, 2010. Cited by 70, Cover page of this issue
- 20- C. de la Calle\*, J.A. Alonso, A. Aguadero, M.T. Fernández-Díaz, F. Porcher "An investigation of the polytypical structure of  $\text{Sr}_{0.2}\text{Ba}_{0.8}\text{CoO}_{3-\delta}$  by neutron powder diffraction" *Zeitschrift fur Kristallographie*, 225, 209-215, 2010
- 21- D. Pérez-Coll\*, A. Aguadero, P. Nuñez, J.R. Frade "Mixed transport properties of  $\text{Ce}_{1-x}\text{Sm}_x\text{O}_{2-x/2}$  system under fuel cell operating conditions" *International Journal of Hydrogen Energy*, 35, 11448-11455, 2010. Cited by 10
- 22- A. Aguadero\*, C. de la Calle, D. Pérez-Coll, J. A. Alonso "Study of the crystal structure, thermal stability and conductivity of  $\text{Sr}(\text{V}_{0.5}\text{Mo}_{0.5})\text{O}_{3+\delta}$  as SOFC material" *Fuel Cells*, 11, 44-50, 2011. Cited by 14

- 23- D. Pérez-Coll\*, A. Agüadero, M. J. Escudero, L. Daza “Electrochemical performance of  $\text{La}_2\text{NiO}_4$ -based cathode for use in Solid oxide fuel cells. Single cell test” *Fuel Cells*, 11, 91-101, 2011. Cited by 16
- 24- R. Martínez-Coronado, A. Agüadero\*, C. de la Calle, M.T. Fernández, J.A. Alonso “Evaluation of the  $\text{R}_2\text{RuMnO}_7$  pyrochlores as cathodes in Solid Oxide Fuel Cells” *Journal of Power Sources*, 196, 4181-4186, 2011. Cited by 22
- 25- A. Agüadero\* J.A. Alonso, M.J. Martínez-Lope, M.T. Fernández-Díaz “Crystallochemical evolution of the  $\text{La}_2\text{ZnTiO}_6$  double perovskite upon reduction: a structural study” *Solid State Science*, 13,13-18, 2011. Cited by 11
- 26- S. Hou, A. Agüadero\* J. A. Alonso, J. B. Goodenough “Fe-based perovskites as electrodes for intermediate-temperature solid oxide fuel cells” *Journal of Power Sources*, 196, 5478-5484, 2011. Cited by 21
- 27- A. Agüadero\* J.A. Alonso, R. Martínez-Coronado, M.J. Martínez-Lope, M.T. Fernández-Díaz “Evaluation of  $\text{Sr}_2\text{CoMoO}_{6-\delta}$  as anode material in SOFC: a neutron diffraction study” *Journal of Applied Physics*, 109, 034907, 2011. Cited by 23
- 28- A. Agüadero\*, M.J. Martínez-Lope, V. Pomjakushim, J. A. Alonso “Oxygen-deficient  $\text{R}_2\text{MoO}_{6-\delta}$  (R=Tb, Dy, Y, Ho, Er, Tm, Yb) with fluorite structure as potential anode for solid oxide fuel cells” *European Journal of Inorganic Chemistry*, 3226-3231, 2011
- 29- A. Agüadero\*, M. Retuerto, F. Jimenez-Villacorta, M. T. Fernandez-Diaz, J.A. Alonso “Evolution of the Co valence and magnetic coupling in the  $\text{SrCo}_{1-x}\text{Sb}_x\text{O}_{3-\delta}$  perovskite oxides” *Physical Chemistry Chemical Physics*, 13, 12835-12843, 2011
- 30- J.A. Alonso\*, M.J. Martínez-Lope, C. de la Calle, J. Sánchez-Benítez, M. Retuerto, A. Agüadero, M.T. Fernandez-Díaz “High-pressure synthesis and characterization of new metaestable oxides” *Functional materials* 4, 333-336, 2011
- 31- A. Agüadero, H. Falcon, J.M. Campos, S. M. Al-Zahrani, J. L. G. Fierro, J. A. Alonso “An oxygen-deficient perovskite as selective catalyst in the oxidation of alkyl benzenes” *Angewandte Chemie*, 50(29), 6557, 2011. Cited by 40
- 32- R. Martínez-Coronado\*, J.A. Alonso, A. Agüadero, M.T. Fernandez-Diaz “Optimized energy conversion efficiency in solid-oxide fuel cells implementing  $\text{SrMo}_{1-x}\text{Fe}_x\text{O}_{3-\delta}$  perovskites as anodes” *Journal of Power Sources*, 208, 153-158, 2012. Cited by 44
- 33- A. Agüadero, L. Fawcett, S. Taub, R. Woolley, K-T. Wu, N. Xu, J. A. Kilner, S. J. Skinner\* “Materials development for intermediate temperature solid oxide electrochemical devices” *Journal of Materials Science*, 47, 3925-3948, 2012. Cited by 144
- 34- A. Agüadero\*, D. Pérez-Coll, J. A. Alonso, S.J. Skinner, J. Kilner “A new family of Mo-doped  $\text{SrCoO}_{3-\delta}$  perovskites for application in reversible solid state electrochemical cells” *Chemistry of Materials*, 24, 2655-2663, 2012, Cited by 97
- 35- R. Martínez-Coronado, A. Agüadero, J.A. Alonso\*, M.T. Fernández-Díaz “Neutron diffraction and magnetic study of the low-temperature transitions in  $\text{SrMo}_{1-x}\text{Fe}_x\text{O}_{3-\delta}$ ” *Materials Research Bulletin*, 47, 2148, 2012
- 36-R. Martínez-Coronado, A. Agüadero\*, D. Pérez-Coll, L. Troncoso, J.A. Alonso, M.T. Fernández-Díaz “Characterization of  $\text{La}_{0.5}\text{Sr}_{0.5}\text{Co}_{0.5}\text{Ti}_{0.5}\text{O}_{3-\delta}$  as reversible electrode material for intermediate-temperature solid-oxide fuel cells” *International Journal of Hydrogen Energy*, 37, 18310, 2012. Cited by 39
- 37- R. Martínez-Coronado\*, A. Agüadero, J.A. Alonso, M.T. Fernández-Díaz “Reversible oxygen removal and uptake in the  $\text{La}_2\text{ZnMnO}_6$  double perovskite: performance in symmetrical SOFC cells” *Solid State Science*, 18, 64, 2013. Cited by 17
- 38- R. Martínez-Coronado\*, J.A. Alonso, A. Agüadero, D. Perez-Coll, M.T. Fernández-Díaz “Neutron structural characterization and transport properties of oxidized and reduced  $\text{La}_{0.5}\text{Sr}_{0.5}\text{M}_{0.5}\text{Ti}_{0.5}\text{O}_3$  (M=Mn, Fe) perovskites: Possible electrode materials in solid-oxide fuel cells” *Journal of Applied Physics*, 113(12), 123708, 2013
- 39- N. Ortiz-Vitoriano, I. R. De Larramendi, S.N. Cook, M. Burriel, A. Agüadero, J.A. Kilner, T. Rojo\*, “The Formation of Performance Enhancing Pseudo-Composites in the

- Highly Active  $\text{La}_{1-x}\text{Ca}_x\text{Fe}_{0.8}\text{Ni}_{0.2}\text{O}_3$  System for IT-SOFC Application” *Advanced Functional Materials*, 23, 5131, 2013. Cited by 29
- 40- C. Tabacaru, A. Aguadero, J. Sanz, A.L. Chinelatto, A. Thursfield, D. Pérez-Coll, I.S. Metcalfe, M.T. Fernandez-Díaz, G.C. Mather\* “Protonic and electronic defects in the 12R-type hexagonal perovskite  $\text{Sr}_3\text{LaNb}_3\text{O}_{12}$ ” *Solid State Ionics*, 239-246, 253, 2013
- 41- R. Martínez-Coronado J.A. Alonso\*, A. Aguadero, M.T. Fernández-Díaz “New  $\text{SrMo}_{1-x}\text{Cr}_x\text{O}_{3-\delta}$  perovskites as anodes in solid-oxide fuel cells” *International Journal of Hydrogen Energy*, 39, 4067, 2014. Cited by 26
- 42- R. Martinez-Coronado\*, A. Aguadero, J. A. Alonso, D. Perez-Coll, “Neutron structural characterization of the oxidised and reduced  $\text{LaCo}_{0.5}\text{Ti}_{0.5}\text{O}_3$  perovskite” *Journal of Physics* 549, 012022, 2014
- 43- H. Tellez\*, A. Aguadero, J. Druce, M. Burriel, S. Fearn, T. Ishihar, D. McPahil, J. A. Kilner, “New perspectives in surface analysis of energy materials by combined time-of-flight secondary ion mass spectrometry (ToF-SIMS) and high sensitivity low-energy ion scattering (HS-LEIS), *Journal of Analytical Atomic Spectrometry*, 29, 1361, 2014. Cited by 34
- 44- F. Aguesse, J. M. Lopez del Amo, V. Roddatis, A. Aguadero\*, John Kilner “Enhancement of the grain boundary conductivity in ceramic LLTO electrolytes in moisture-free processing environment” *Advanced Materials: Interfaces*, 1300143, 2014. Cited by 26
- 45- C. Bernuy-Lopez, W. Manalastas, J. M. Lopez del Amo, A. Aguadero\*, F. Aguesse, J. Kilner “Atmosphere Controlled Processing of Ga-Substituted Garnets for high Li-ion conductivity ceramics” *Chemistry of Materials* 26, 3610, 2014. Cited by 169
- 46- L. Troncoso\*, J.A. Alonso, M.T. Fernández-Díaz, A. Aguadero “Introduction of interstitial oxygen atoms in the layered perovskite  $\text{LaSrIn}_{1-x}\text{B}_x\text{O}_{4+\delta}$  system (B= Zr, Ti)” *Solid State Ionics*, 282, 82, 2015
- 47- L. Troncoso, J. A. Alonso, A. Aguadero\* “Low activation energies for interstitial oxygen conduction in the layered perovskites  $\text{La}_{1+x}\text{Sr}_{1-x}\text{InO}_{4+\delta}$ ” *Journal of Materials Chemistry A*, 34, 17779, 2015. Cited by 12
- 48- V. Celorrio, L. Calvillo, E. Dann, G. Granozzi, A. Aguadero, D. Kramer, A. E. Russell, D. J Fermín\* “Oxygen reduction reaction at  $\text{La}_x\text{Ca}_{1-x}\text{MnO}_3$  nanostructures: interplay between A-site segregation and B-site valency” *Catalysis Science and Technology* 6(19) 7231, 2016. Cited by 36
- 49- V. Cascos, A. Aguadero, G. Harrington, M. T. Fernández-Díaz, J. A. Alonso\* “Design of  $\text{Sr}_{0.7}\text{R}_{0.3}\text{CoO}_{3-\delta}$  (R= Tb and Er) Perovskites Performing as Cathode Materials in Solid Oxide Fuel Cells” *Journal of The Electrochemical Society*, 164, F3019, 2017
- 50- W. Song, R. Brugge, I. Theodorou, A. L. Lim, T. Zhao, Y. Yang, C. Burgess, I. Johnson, A. Aguadero, P. Shearling, D. Brett, F. Xie, D. J. Riley\* “Enhancing MOF Derived ZnO as a Lithium Battery Anode Material by the Addition of Ag<sub>2</sub>S Quantum Dots” *ACS Applied Materials & Interfaces* 9 (43), 37823, 2017
- 51- S. R. Bishop, X. Liu, A. Aguadero “Preface-JES focus issue on oxygen reduction and evolution reactions for high temperature energy conversion and storage” *Journal of The Electrochemical Society*, 164, Y11, 2017
- 52- D. Shih, A. Aguadero, S. Skinner\* “Improvement of ionic conductivity in A-site lithium-doped sodium bismuth titanate” *Solid State Ionics* 317, 32, 2018
- 53- W. Song, K. Ji, A. Aguadero, P. Shearing, D. Brett, F. Xie, D. J. Riley\* “ $\text{Co}_3\text{O}_4$  hollow nanospheres doped with  $\text{ZnCo}_2\text{O}_4$  via thermal vapour mechanism for fast lithium storage” *Energy Storage Materials*, 14, 324, 2018
- 54- M. Yattoo, Z. Du, H. Zhao, A. Aguadero, S. Skinner\* “ $\text{La}_2\text{Pr}_2\text{Ni}_3\text{O}_{10}$  Ruddlesden-Popper phase as potential intermediate temperature solid oxide fuel cell cathodes” *Solid State Ionics*, 320, 148, 2018
- 55- R. Brugge, O. Helselman, A. Cavallaro, F. Pesci, R. Chater, J. Kilner, A. Aguadero\* “Garnet electrolytes for solid state batteries: Visualisation of the moisture-induced chemical degradation and revealing its impact on the Li-ion dynamics” *Chemistry of Materials*, 30 (11), 3704, 2018. Cited by 21

- 56- G. Vardar, W. J. Bowman, Q. Lu, J. Wang, R. J. Chater, A. Aguadero, R. Seibert, J. Terry, A. Hunt, I. Waluyo, D. D. Fong, A. Jarry, E. J. Crumlin, S. L. Hellstrom, Y-M. Chiang, B. Yildiz\*, “Structure, chemistry and charge transfer resistance of the interface between  $\text{Li}_7\text{La}_3\text{Zr}_2\text{O}_{12}$  electrolyte and  $\text{LiCoO}_2$  cathode” *Chemistry of Materials*, 30 (18) 6259-6276, 2018. Cited by 15
- 57- V. Celorrio, L. Calvillo, C. Van den Bosch, G. Granozzi, A. Aguadero, A. Russel, D. Fermin\* “Mean intrinsic activity of single Mn sites at  $\text{LaMnO}_3$  nanoparticles towards the oxygen reduction reaction” *ChemElectroChem* 5 (20) 3044-3051, 2018
- 58- F. Pesci, R. Brugge, O. Hekselman, A. Cavallaro, R. Chater, A. Aguadero\* “Elucidating the role of dopants in the critical current density for dendrite formation in garnet electrolytes” *Journal of Materials Chemistry A* 6 (43) 37823-37832, 2018
- 59- M. A. Yattoo, A. Aguadero, S. Skinner\* “ $\text{LaPr}_3\text{Ni}_3\text{O}_{9.76}$  as a candidate solid oxide fuel cell cathode: Role of microstructure and interface structure on electrochemical performance”, *APL Materials* 7 (1) 013204, 2019
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- 64- R. H. Brugge, F. M. Pesci, A. Cavallaro, C. Sole, M. A. Isaacs, G. Kerherve, R. S. Weatherup, A. Aguadero\* “The origin of chemical inhomogeneity in garnet electrolytes and its impact on the electrochemical performance” *Journal of Materials Chemistry A*, 8, 28, 14265, 2020
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- 67- O. Celikbilek, A. Cavallaro, G. Kerherve, S. Fearn, O. Chaix-Pluchery, A. Aguadero, J. A. Kilner, S. J. Skinner “Surface Restructuring of Thin-Film Electrodes Based on Thermal History and Its Significance for the Catalytic Activity and Stability at the Gas/Solid and Solid/Solid Interfaces”, *ACS applied materials & interfaces* 12(30), 34388, 2020
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### **Publications in proceedings**

- 1- A. Aguadero, J.A. Alonso, M. Pérez, R. Fernández, L. Daza “Influencia del tratamiento a alta presión de oxígeno en el sistema  $\text{La}_2\text{Ni}_{1-x}\text{Cu}_x\text{O}_{4+d}$  ( $0 < x < 1$ ) como cátodo para IT-SOFC “Conapice 2004 Proceedings, pp. 102-107, 2004

- 2- A. Aguadero, M. Pérez, J.A. Alonso, L. Daza “Influence of high oxygen pressure treatments on *Solid electrochemistry*, 26th. Risø International Symposium on Materials Science *Proceeding*, pp 107-111 (ISBN 87-550-3455-1; ISSN 0907-0079)
- 3- A. Aguadero, M. Pérez, M. J. Escudero, J. A. Alonso, L. Daza “ $\text{La}_{2-x}\text{Sr}_x\text{NiO}_{4+d}$  ( $x=0-0.1$ ) mixed conductors as cathodes for intermediate temperature solid oxide fuel cells” 1st European Fuel Cell Technology and Applications Conference Proceedings, pp 187-191 (ISBN No0-7918-4209-6)
- 4- A. Aguadero, J.A. Alonso, M. Pérez, R. Fernández, L. Daza “Evolución térmica de la estructura y propiedades eléctricas de  $\text{La}_2\text{Ni}_{0.6}\text{Cu}_{0.4}\text{O}_{4+d}$ , como posible cátodo para IT-SOFC” Conappice 2006 Proceedings, pp 105-109 (ISBN No-84-690-1309-2)
- 5- J.A. Alonso, M.J. Martínez-Lope, A. Aguadero, L. Daza “La difracción de neutrones como técnica de caracterización de materiales de SOFC” Conappice 2006 Proceedings, pp 29-32 (ISBN No-84-690-1309-2)
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- 7- J. Soler, J. Lemus, M.P. Pina, J. Sanz, A. Aguadero, J.A. Alonso “Evaluation of the Pyrochlore ( $\text{H}_3\text{O}$ ) $\text{SbTeO}_6$  as a Candidate for Electrolytic Membranes in PEM Fuel Cells” Hyceltec 2008 : I Simposium Ibérico de Hidrógeno, Pilas de Combustible y Baterías Avanzadas ISBN 13: 978-84-9860-101-5
- 8- A. Aguadero, C. de la Calle, D. Pérez-Coll, J.A. Alonso, J.B. Goodenough “New  $\text{SrCoO}_{3-\delta}$  derivatives as promising cathodes for IT-SOFC” 12<sup>th</sup> European Conference on Solid State Chemistry pg. 77 (ISBN: 978-3-936028-60-7)
- 9- D. Pérez-Coll, A. Aguadero, P. Núñez, J.R. Frade Mixed transport properties of  $\text{Ce}_{1-x}\text{Sm}_x\text{O}_{2-\square}$  under fuel cell operating conditions” Hyceltec 2009 Proceedings SA6-O1
- 10- A. Aguadero, C. de la Calle, D. Pérez-Coll, J.A. Alonso, J.B. Goodenough “New cathodes for IT-SOFC based upon doped  $\text{SrCoO}_{3-\delta}$  perovskites” Hyceltec 2009 Proceedings SA6-O5
- 11- D. Pérez-Coll, A. Aguadero, M. J. Escudero, L. Daza “Electrochemical behaviour of  $\text{La}_2\text{Ni}_{0.6}\text{Cu}_{0.4}\text{O}_4$  oxide on SDC electrolyte as cathode for IT-SOFC” Proceedings 216 th ECS Meeting Viena October 4-9, 2009 ISSN 1091-8213
- 12- R. Martínez-Coronado, A. Aguadero, J. A. Alonso “Evaluación de los pirocloros  $\text{R}_2\text{RuMnO}_7$  como cátodos SOFC” Conappice 2010 Libro de Comunicaciones, 53-56, ISBN 978-84-693-2330
- 13- A. Aguadero, D. Pérez-Coll, J. A. Alonso “Mo-doped  $\text{SrCoO}_{3-\delta}$  perovskites as cathodes in Intermediate Temperature Solid Oxide Fuel Cells” Proceeding of Fundamentals and Developments of Fuel Cells Conference S9-P15 (ISBN: 978-2-7466-2970-7)
- 14- A. Aguadero, D. Pérez-Coll, J. Kilner S. Skinner “Effect of the current polarisation on the versatility of  $\text{SrCoO}_{3-\delta}$  derivatives as electrodes for solid oxide fuel cells and electrolysers” 11<sup>th</sup> European SOFC and SOE Forum, 2014, Lucerne, Switzerland

### **Patents**

M. Al-Zahrani, Horacio Falcon Richeni, Ainara Aguadero, José Antonio Alonso, Jose Miguel Campos Martín, José Luis G. Fierro “Method for preparing carboxylic acids”\_United States US 8,575,387 B2, Issued: Nov 5, 2013

### **Plenary and Invited talks and seminars**

- 1- Department of Materials, Imperial College London, *Invited*, “Novel  $\text{SrCoO}_{3-\delta}$  derivatives as cathode materials in intermediate temperature solid oxide fuel cells” 29<sup>th</sup> March 2011
- 2- CIC Energigune, *Invited*, “Crystal structural to physical properties relationship in ceramic materials for energetic applications” 14<sup>th</sup> November 2011



- 3- Swiss Federal Institute of Technology Zurich (ETHZ), *Invited*, “New perovskite mixed ionic-electronic conductors for intermediate temperature solid oxide fuel cell electrodes” 15<sup>th</sup> February 2012
- 4- University of Cambridge, *Invited*, “Ceramic conducting oxides for next generation energy devices” 12<sup>th</sup> February 2014
- 5- Massachusetts Institute of Technology (MIT), *Invited* “Ceramic conducting oxides for next generation energy devices” 7<sup>th</sup> May 2014
- 6- University of Bristol, *Invited*, “Oxides for solid state energy devices” 5<sup>th</sup> August 2014
- 7-Workshop El Sol: Electrochemical solutions for contemporary problems, *Plenary*, “Improvement of transport properties in fast Li-conducting ceramic oxides”, Brazil, 9-12<sup>th</sup> March 2015
- 8- Valencia Summer School 2015, *Invited Lecture* “Ionic and protonic conducting ceramic membranes for green energy applications” Valencia, Spain 3-25<sup>th</sup>, September 2015
- 9- Materials Society Imperial College, *Invited Lecture* “Tuning transport properties of ceramic oxides”, London, UK 16<sup>th</sup> February 2016
- 10- EMN Fuel Cells Meeting, *Invited*, “Redox perovskites for enhanced performance electrodes in electrochemical systems “Jeju, South Korea 24-26<sup>th</sup> May 2016
- 11- ECS 229<sup>th</sup> Meeting, *Invited*, “Revealing optimum Li-conductivity in garnet electrolytes” San Diego, USA, 29<sup>th</sup> May- 2<sup>nd</sup> June 2016
- 12- STFC meeting, *Invited* “Isotopic labelling experiments for Li-battery electrolytes” Abingdon, UK 14-15<sup>th</sup> July 2016
- 13- Institute of Chemical Technologies and Analytics, TU Wien, *Invited*, “Li-conductivity and moisture reactivity of garnet electrolytes” 24<sup>th</sup> August 2016, Viena, Austria
- 14- Institute for Molecular Science and Engineering, *Invited*, “Perovskite-based electrodes in solid electrochemical systems” 29<sup>th</sup> September 2016, London, UK
- 15- Sustainable Materials for Emerging Energy Technology (SMEET III), IOM3, *Invited*, “Perovskite-based electrodes in solid electrochemical systems” 1<sup>st</sup> December 2016, London, UK
- 16- CICEnergigune, *Invited* “Redox perovskites and their performance under in-situ electrochemical conditions” 21<sup>st</sup> December 2016, Vitoria, Spain
- 17- Solid State Ionics conference (SSI-XXI), *Invited* “Degradation processes and ionic transport in garnet-based solid electrolytes”, 18<sup>th</sup>-23<sup>rd</sup> June 2017, Padova, Italy
- 18- Interfaces in Energy Materials, *Invited*, “Local Chemical Degradation Processes and Ionic Transport in Garnet All-Solid-State-Batteries”, 10-12<sup>th</sup> April 2018, Cambridge, UK
- 19- Diffraction on Energy Materials Symposium, *Invited* “Role of defect chemistry on the electrochemical performance of solid-state electrochemical devices”, 10-12<sup>th</sup> October 2018, Institute Laue-Langevin, Grenoble, France
- 20- Stephenson Institute for Renewable Energy, *Invited* “Local chemical degradation processes and ionic transport in Garnet all-solid-state batteries“, 29<sup>th</sup> January 2019, Liverpool, UK
- 21- STFC Early career researchers, *Keynote* “Understanding the factors affecting Li/garnet interfaces with surface analysis” 18-19<sup>th</sup> March 2019, Abingdon, UK
- 22-Industry Workshop, Centre of Advanced Materials for Integrated Energy Systems, *Plenary* “Advanced Ceramics for Energy Applications“, 7<sup>th</sup> May 2019, University of Cambridge, UK.
- 23 ECEE, Electrochemical Conference on Energy and Environment: Bioelectrochemistry and energy storage, *Invited* “Dynamic interfaces in solid state batteries”, 21-26<sup>th</sup> July 2019, Glasgow, UK.
- 24- STFC Batteries *Invited*, “Degradation phenomena in solid interfaces”, 1-2<sup>nd</sup> July 2019, Abingdon, UK
- 25- E-MRS 2019 Fall Meeting, *Invited* “Chemical and electrochemical degradation in metal anode/solid-electrolyte interfaces for solid state batteries“, 16-19<sup>th</sup> September 2019, Warsaw, Poland

- 26- Huawei UK technology workshop, *Plenary* “Next generation of solid state energy devices “ 26-27th September 2019, London, UK.
- 27- ICN2 Seminar, *Invited* “Optimisation of ion dynamics for the next generation of solid state energy devices“ 31st October 2019, Barcelona, Spain.
- 28- HITESEA Workshop, *Invited* “Quantification of oxygen dynamics in passivated surfaces of perovskites due to strontium segregation”, ICV-CSIC, 29-30 January, Madrid, Spain
- 29- The Power of Interfaces: Fundamentals for Solid State Devices, *Invited* “Understanding the Factors Governing the Performance of Garnet Electrolytes in Li Metal” Royal Society, 10-11<sup>th</sup> March 2020, London UK

### **Contributions to scientific conferences**

- 1- “Influencia del tratamiento a alta presión de oxígeno en el sistema  $\text{La}_2\text{Ni}_{1-x}\text{Cu}_x\text{O}_{4+d}$  ( $0 < x < 1$ ) como cátodo para IT-SOFC” **Oral**, *Conappice 2004*, San Sebastián, España
- 2- “Influence of high oxygen pressure treatments on the oxygen mobility of  $\text{La}_2\text{Ni}_{1-x}\text{Cu}_x\text{O}_{4+d}$  ( $0 \leq x \leq 1$ )” **Oral**, *26th. Risø International Symposium on Materials Science*, 2005, Denmark
- 3- “ $\text{La}_{2-x}\text{Sr}_x\text{NiO}_{4+d}$  ( $x=0-0.1$ ) mixed conductors as cathodes for intermediate temperature solid oxide fuel cells” **Poster**, *1<sup>st</sup> European Fuel Cell Technology and Applications Conference*, 2005, Rome, Italy
- 4- “Evolución térmica de la estructura y propiedades eléctricas de  $\text{La}_2\text{Ni}_{0.6}\text{Cu}_{0.4}\text{O}_{4+d}$ , como posible cátodo para IT-SOFC” **Oral**, *Conappice 2006*, Madrid, Spain
- 5- “La difracción de neutrones como técnica de caracterización de materiales de SOFC” **Oral**, *Conappice 2006*, Madrid, España
- 6- “Structural and electrochemical properties of  $\text{La}_{2-x}\text{Sr}_x\text{NiO}_{4+d}$  oxides as cathode materials for Intermediate-Temperature SOFC” **Poster**, *Fuel Cell Seminar*, 2006, Honolulu, Hawaii
- 7- “ $\text{La}_2\text{Ni}_{1-x}\text{Co}_x\text{O}_{4+\delta}$  mixed conductors as novel cathode materials for SOFC” **Poster**, *Fuel Cell Seminar*, 2007, Texas, US
- 8- “Performance of  $\text{La}_{1.75}\text{Sr}_{0.25}\text{NiO}_{4+\delta}$  cathode on  $\text{Ce}_{0.8}\text{Ln}_{0.2}\text{O}_{2-\delta}$  ( $\text{Ln} = \text{La}, \text{Nd}$ ), LSGM and YSZ electrolytes” **Poster**, *SOFC European Forum 2008*, Lucerne, Switzerland
- 9- “Caracterización de la perovskita  $\text{Ca}(\text{V}_{0.5}\text{Mo}_{0.5})\text{O}_3$  como ánodo SOFC” **Poster**, *Conappice 2008*, Zaragoza, Spain
- 10- “Estudio de la resistencia de interfase cátodo-electrolito en el sistema  $\text{La}_2\text{NiO}_4$ - $20\text{CSO}_2\text{Co}$  bajo corriente de polarización” **Oral**, *Conappice 2008*, Zaragoza, Spain
- 11- “Evaluación de los óxidos  $\text{SrCo}_{1-x}\text{Sb}_x\text{O}_{3-d}$  para cátodos en IT-SOFC” **Poster**, *Conappice 2008*, Zaragoza, Spain
- 12- “Evaluation of the Pyrochlore( $\text{H}_3\text{O}$ )  $\text{SbTeO}_6$  as a Candidate for Electrolytic Membranes in PEM Fuel Cells” **Poster**, *Iberian Symposium on Hydrogen, Fuel Cells and Advanced Batteries*, 2008, Bilbao, Spain.
- 13- “El sistema  $\text{SrCoO}_{3-\delta}$  y sus derivados como cátodos en SOFC: correlaciones entre estructura y transporte” **Oral**, *IV Reunión de la Sociedad Española de Técnicas Neutrónicas*, Sant Feliu de Guíxols (Girona) Spain:
- 14- “New  $\text{SrCoO}_{3-\delta}$  derivatives as promising cathodes for IT-SOFC” **Oral**, *12<sup>th</sup> European Conference on Solid State Chemistry (ECSSC XII)*, 2009, Muenster, Germany.
- 15- “Mixed transport properties of  $\text{Ce}_{1-x}\text{Sm}_x\text{O}_{2-\delta}$  under fuel cell operating conditions” **Oral**, *Hyceltec 2009*, Vila Real, Portugal.
- 16- “New cathodes for IT-SOFC based upon doped  $\text{SrCoO}_{3-\delta}$  perovskites” **Oral**, *Hyceltec 2009*, Vila Real, Portugal
- 17- “Electrochemical behavior of Sb-doped  $\text{SrCoO}_{3-\delta}$  with LSGM and ceria-based electrolytes” **Oral**, *Workshop on Solid Oxide Fuel Cells: Materials and technology*, 2009, Albacete, Spain
- 18- “Electrochemical behaviour of  $\text{La}_2\text{Ni}_{0.6}\text{Cu}_{0.4}\text{O}_4$  oxide on SDC electrolyte as cathode for IT-SOFC” **Poster**, *216<sup>th</sup> ECS Meeting*, 2009, Vienna, Austria

- 19- "Evaluation of  $\text{La}_2\text{NiO}_{4+\delta}$  Oxide as Alternative Cathode Material for IT-SOFC Based on Doped Ceria Electrolytes" **Poster**, *Fuel Cell Seminar 2009*, Palm Springs, California
- 20- "High pressure synthesis and characterization of new metastable oxides" **Oral**, *IUPAC 6<sup>th</sup> International Conference (NMS-VI)*, 2010, Wuhan, China
- 21- "Evaluación de los pirocloros  $\text{R}_2\text{RuMnO}_7$  como cátodos SOFC" **Poster**, *Congreso Nacional de Pilas de Combustible Conappice 2010*, Seville, Spain
- 22- "Mo-doped  $\text{SrCoO}_{3-\delta}$  perovskites as cathodes in Intermediate Temperature Solid Oxide Fuel Cells" **Poster**, *Fundamentals and Developments of Fuel Cells FDFC*, 2011, Grenoble, France.
- 23- "Development of mixed ionic-electronic conductor electrodes for reversible SOFC-SOEC" **Poster**, *Imperial College PostDoc Symposium 2011*, Department of Materials, London, UK
- 24- "A new  $\text{La}_{0.5}\text{Sr}_{0.5}\text{Mn}_{0.5}\text{Co}_{0.5}\text{O}_{3-\delta}$  anode for low-temperature solid oxide fuel cells" **Oral**, *MRS Fall meeting 2011*, Boston, MA, US
- 25- " $\text{SrMo}_{1-x}\text{Fe}_x\text{O}_{3-\delta}$  anodes for high performance solid-oxide fuel cells" **Poster**, *10<sup>th</sup> European Fuel Cell Forum 2012*, Lucern, Switzerland
- 27- "Perovskitas  $\text{SrMo}_{1-x}\text{Cr}_x\text{O}_3$  ( $x= 0.1$  y  $0.2$ ) como ánodos para SOFC" **Oral**, *Conappice 2012*, Madrid, Spain
- 28- "In-plane ionic conductivity of  $\text{Li}_{(3x)}\text{La}_{(2/3-x)}\text{TiO}_3$  thin films deposited on perovskite substrates" **Poster**, *The Electrochemical Society 22nd meeting*, 2012, Honolulu, Hawaii, USA
- 29- "Factors governing the Li-conduction mechanism in  $\text{Li}_3\text{La}_{2/3-x}\text{TiO}_3$  perovskites" **Oral**, *Solid State Ionics Conference SSI-19*, 2013, Kyoto, Japan
- 30- " $\text{Li}_{7-3x}\text{Ga}_x\text{La}_3\text{Zr}_2\text{O}_{12}$  ( $0 \leq x \leq 0.5$ ): Influence on the structure and lithium-ion conductivity of the gallium doping" **Poster**, *Solid State Ionics Conference SSI-19*, 2013, Kyoto, Japan
- 31- " $^7\text{Li}$  and  $^1\text{H}$  Solid-state NMR Investigations of Improved Materials for Li batteries" **Poster**, *EUROMART*, 30<sup>th</sup> June- 5<sup>th</sup> July 2013, Hersonissos, Greece. *Best poster award*
- 32- "Importance of moisture control on the processing of high Li conducting oxides" **Poster**, *Functional Inorganic Materials*, 20<sup>th</sup> June 2013, University of Liverpool, Liverpool, UK
- 33- "Multipurpose electrode materials for intermediate temperature solid oxide electrochemical systems" **Poster**, *H<sub>2</sub>-FC Supergen*, 16-18<sup>th</sup> December 2013, Birmingham, UK
- 34- "On the control of moisture corrosion processes for the optimization of transport properties in fast Li-conducting ceramic electrolytes" **Oral**, *MRS-Spring meeting*, 21<sup>st</sup> -25<sup>th</sup> April 2014, San Francisco, US
- 35- "Processing control in superior Li-ion conducting electrolytes: the effect of moisture exposure", **Oral**, *Power Our Future*, 1<sup>st</sup>-4<sup>th</sup> April 2014, Vitoria, Spain
- 36- "Solid State NMR studies of Li and Na-based battery materials", **Oral**, *Power Our Future*, 1<sup>st</sup>-4<sup>th</sup> April 2014, Vitoria, Spain
- 37- "Structural and electrochemical nuances in Ga-doped  $\text{Li}_7\text{La}_3\text{Zr}_2\text{O}_{12}$  due to protonation effects", **Poster**, *Power Our Future*, 1<sup>st</sup>-4<sup>th</sup> April 2014, Vitoria, Spain
- 38- "Ultrafast  $^1\text{H}$  and  $^7\text{Li}$  Solid-State NMR Studies of Materials for Next-Generation Batteries" **Poster**, *17<sup>th</sup> International Meeting on Lithium Batteries*, 10-14<sup>th</sup> June 2014, Lake Como, Italy
- 39- "Are Oxide Electrolytes Moisture Insensitive? Effect of Corrosion at the Grain Surface of  $\text{Li}_3\text{La}_{2/3-x}\text{TiO}_3$ " **Poster**, *17<sup>th</sup> International Meeting on Lithium Batteries*, 10-14<sup>th</sup> June 2014, Lake Como, Italy
- 40- "Effect of Controlled Atmosphere Processing for the Achievement of High Conductivity in Li-ion Ceramics" **Poster**, *65<sup>th</sup> Annual Meeting of the International Society of Electrochemistry*, 31<sup>st</sup>-5<sup>th</sup> August 2014, Lausanne, Switzerland
- 41- "Ga-substituted  $\text{Li}_7\text{La}_3\text{Zr}_2\text{O}_{12}$  garnets revisited: Substitution for optimized Li-ion conductivity and ageing effects" **Poster**, *65<sup>th</sup> Annual Meeting of the International Society of Electrochemistry*, 31<sup>st</sup>-5<sup>th</sup> August 2014, Lausanne, Switzerland

- 42-“Ultrafast MAS solid-state NMR studies of battery materials. Material performance and controlled atmosphere processing” **Oral**, *GERMN2014 (IV Iberian NMR Meeting/ VI Iberoamerican NMR Meeting)* 2014, Alcala de Henares, Spain
- 43- “Effect of the current polarisation on the versatility of SrCoO<sub>3-δ</sub> derivatives as electrodes for solid oxide fuel cells and electrolysers” **Oral**, 11<sup>th</sup> European SOFC and SOE Forum, 1<sup>st</sup>-4<sup>th</sup> July 2014, Lucerne, Switzerland
- 44- “Moisture control for the optimization of the microstructure and transport properties of Li-conducting ceramic oxides” **Oral**, *Symposium on energy Materials*, 22<sup>nd</sup> September, Bath, UK
- 45- Breathing Batteries: next generation rechargeable energy storage?, **Poster**, *UKES2015, Energy storage Conference*, 25-27 November 2014, Warwick, UK
- 46- Moisture corrosion processes affecting transport properties in Li-conducting ceramic electrolytes, **Oral**, *UKES2015, Energy storage Conference*, 25-27 November 2014, Warwick, UK
- 47- “Improvement of transport properties in Li-conducting ceramic oxides” **Oral**, *227th ECS Meeting*, 24-28 May 2015, Chicago, USA
- 48- “Revealing the Li Conduction Pathway using Dopants at the Li sites in stuffed Garnets” **Poster**, *227th ECS Meeting*, 24-28 May 2015, Chicago, USA
- 49- “Optimizing Surface Segregation and Defect Structure of a Perovskite through Strain for Improving Oxygen Reduction and Evolution Catalysis” **Oral**, *227th ECS Meeting*, 24-28 May 2015, Chicago, USA
- 50- Revealing Lithium Conduction Pathways in Lithium-Rich Garnets Using Aliovalent Dopants, **Oral**, *Solid State Ionics SSI-20*, 13-19 June 2015, Keystone, USA
- 51- A Variable Oxygen Perovskite for Improving Oxygen Reduction and Evolution Catalysis, **Poster**, *Solid State Ionics SSI-20*, 13-19 June 2015, Keystone, USA
- 52- “Revealing Lithium Conduction Pathways in Lithium-Rich Garnets Using Aliovalent Dopants” **Oral**, *ECS Conference on electrochemical energy conversion & storage*, 26-31<sup>st</sup> July, 2015, Glasgow, UK
- 53- “Investigating the surface segregation of perovskite thin films to optimise the redox behaviour for application in metal-air batteries” **Poster**, *ECS Conference on electrochemical energy conversion & storage*, 26-31<sup>st</sup> July, 2015, Glasgow, UK
- 54- “Performance optimization of Li<sup>+</sup> based solid electrolytes monitored by solid state NMR”, **Oral**, *8<sup>th</sup> International conference on Advance Batteries for Automotive Applications*, ABAA8, 30<sup>th</sup> September- 2<sup>nd</sup> October 2015, Bilbao, Spain
- 55- “Improvement of transport properties in fast Li-conducting ceramic oxides” **Plenary Workshop** El Sol : Electrochemical solutions for contemporary problems, 9-12<sup>th</sup> March 2015, Deferal University of Sao Carlos, Brazil
- 56- “Effects of strain on redox behaviour of thin-film La<sub>0.5</sub>Sr<sub>0.5</sub>Co<sub>0.5</sub>Mn<sub>0.5</sub>O<sub>3-δ</sub> (LSMC) investigated by *in situ* x-ray diffraction” **Poster**, *EMRS*, , 2-6<sup>th</sup> May 2016
- 57- “In situ evaluation of redox behaviour in La<sub>0.5</sub>Sr<sub>0.5</sub>Co<sub>0.5</sub>Mn<sub>0.5</sub>O<sub>3-δ</sub> (LSMC) epitaxial thin films under bias using <sup>18</sup>O isotopic labelling” **Oral**, *EMRS*, 2-6<sup>th</sup> May 2016
- 58- “Exploring ReRAM through isotopically labelled oxygen atmosphere: investigating filamentation and switching mechanics” **Poster**, *EMRS*, 2-6<sup>th</sup> May 2016
- 59- “Conductivity and Degradation in Garnet Electrolytes”, **Poster**, *18<sup>th</sup> International Conference in Li-Batteries IMLB*, 19-24<sup>th</sup> June 2016, Chicago, USA
- 60-“Strained-induced oxygen non-stoichiometry on La<sub>0.5</sub>Sr<sub>0.5</sub>Mn<sub>0.5</sub>Co<sub>0.5</sub>O<sub>3-δ</sub> thin films” **Oral**, *ECS 229<sup>th</sup> Meeting*, 29<sup>th</sup> May- 2<sup>nd</sup> June 2016, San Diego, USA
- 61- “Revealing the optimum Li-mobility in garnet electrolytes” **Invited Oral**, *ECS 229<sup>th</sup> Meeting*, 29<sup>th</sup> May- 2<sup>nd</sup> June 2016, San Diego, USA
- 62- “Redox perovskites for enhanced performance electrodes in electrochemical systems” **Invited Oral**, *EMN Meeting on Fuel Cells*, 24-26<sup>th</sup> May 2016, Jeju, South Korea
- 63- “Isotopic labelling experiments for Li-battery electrolytes” **Keynote**, *STFC meeting*, 14-15<sup>th</sup> July 2016, Abingdon, UK

- 64- “The interaction of SiO<sub>x</sub>-based Resistive RAM devices with oxygen: observations on release and absorption” **Oral**, *ECS Prime 2016*, Honolulu, Hawaii
- 65- “Oxygen Breathing in Intrinsic SiO<sub>x</sub>-based ReRAM Devices” **Poster**, *MRS Fall Meeting*, November 27<sup>th</sup> – 2<sup>nd</sup> December 2016, Boston, USA
- 66- “Simultaneous positive and negative FIB-SIMS of a SiO<sub>x</sub>-based Resistive RAM device” **Poster** *SIMS Europe* 18-20th September 2016, Muster, Germany
- 67- “Isotopic labelling and diffusion in garnet-type Li conductors” **Poster** *SIMS Europe* 18-20th September 2016, Muster, Germany
- 68- “In situ investigation of La<sub>0.5</sub>Sr<sub>0.5</sub>Mn<sub>0.5</sub>Co<sub>0.5</sub>O<sub>3-δ</sub> epitaxial thin films under electrical bias using <sup>18</sup>O isotopic labelling and FIB-SIMS” **Oral**, *SIMS Europe* 18-20th September 2016, Muster, Germany
- 69- “Perovskite-based electrodes in solid electrochemical systems” **Invited Oral**, Sustainable Materials for Emerging Energy Technology (SMEET III), IOM3 1st December 2016, London, UK
- 70- “Improvement of Electrical Conductivity in Sodium Bismuth Titanate by A-site Acceptor Doping” **Oral**, *Supergen Conference*, 12-14<sup>th</sup> December 2016, Belfast, Ireland
- 71- “Development of Higher Order Ruddlesden-Popper Phases for Solid Oxide Fuel Cell Cathode Materials” **Oral**, *Supergen Conference*, 12-14<sup>th</sup> December 2016, Belfast, Ireland
- 72- “Effect of Pentavalent Substitution on the Structure and Ion Transport in Garnet-type Li<sub>7</sub>La<sub>3</sub>Zr<sub>2</sub>O<sub>12</sub> Electrolytes”, **Poster**, *Solid State Ionics Symposium SSI21*, 18-23rd June 2017, Padova, Italy
- 73- “In Situ Investigation of Strain Effects on the Redox Behaviour of Thin Film La<sub>0.5</sub>Sr<sub>0.5</sub>Mn<sub>0.5</sub>Co<sub>0.5</sub>O<sub>3-δ</sub>”, **Oral**, *Solid State Ionics Symposium SSI21*, 18-23rd June 2017, Padova, Italy
- 74- “Transport Processes following Proton Exchange in Garnet Electrolytes”, **Oral**, *Solid State Ionics Symposium SSI21*, 18-23rd June 2017, Padova, Italy
- 75- “Improvement of Ionic Conductivity in A-site Lithium Doped Sodium Bismuth Titanate”, **Oral**, *Solid State Ionics Symposium SSI21*, 18-23rd June 2017, Padova, Italy
- 76- “Degradation processes and ionic transport in garnet-based solid electrolyte”, **Invited Oral**, *Solid State Ionics Symposium SSI21*, 18-23rd June 2017, Padova, Italy
- 77- “La<sub>2</sub>Pr<sub>2</sub>Ni<sub>3</sub>O<sub>10±d</sub> Ruddlesden-Popper phases as potential intermediate temperature-solid oxide fuel cell cathodes”, **Oral**, *Solid State Ionics Symposium SSI21*, 18-23rd June 2017, Padova, Italy
- 78- “Local Chemical Degradation Processes and Ionic Transport in Garnet All-Solid-State-Batteries”, **Invited Oral**, *Interfaces in Energy Materials*, 10-12<sup>th</sup> April 2018, Cambridge, UK
- 79- “B-site doped strontium cobalt oxides for water splitting via thermochemical redox reactions” **Oral**, EMRS 2018, 18-22nd June 2018, Strasbourg, France
- 80- “Electrochemical and Chemical Analysis of Dendrites Formation in Al- and Ga- doped Li<sub>7</sub>La<sub>3</sub>Zr<sub>2</sub>O<sub>12</sub>” **Poster**, *IMBL 2018*, 17th – 22nd June 2018, Kyoto, Japan
- 81- “New methodology to investigate grain and grain boundaries resistivity in LLZO garnet”, **Poster**, *IMBL 2018*, 17th – 22nd June 2018, Kyoto, Japan
- 82- “Garnet Electrolytes for Solid State Batteries moisture-degradation and its Impact on Li-Ion dynamics” **Poster**, *IMBL 2018*, 17th – 22nd June 2018, Kyoto, Japan
- 83- “Electrochemical and Chemical Analysis of Dendrites Formation in Al- and Ga- doped Li<sub>7</sub>La<sub>3</sub>Zr<sub>2</sub>O<sub>12</sub>” **Oral**, *7th EuCheMS Chemistry Congress*, 26th – 30th August 2018, Liverpool, UK
- 84- “Moisture-Induced Degradation in Garnet Electrolytes for Solid State Batteries” **Oral**, *7th EuCheMS Chemistry Congress*, 26th – 30th August 2018, Liverpool, UK
- 85- “Role of defect chemistry on the electrochemical performance of solid-state electrochemical devices”, **Invited Oral**, *Diffraction on Energy Materials*, 10-12<sup>th</sup> October 2018, Institute Laue-Langevin, Grenoble, France
- 86- “Understanding the factors affecting Li/garnet interfaces with surface analysis”, **Keynote** STFC ECRC Conference, 18-19th March 2019, Abingdon, UK

- 87-“Reduction of the Na metal/NaSICON interfacial resistance by thermal etching” **Oral**, *STFC ECRC conference*, 18-19th March 2019 Abingdon, UK
- 88- “Degradation phenomena in solid interfaces” **Invited Oral** STFC Batteries, 1-2nd July 2019, Abingdon, UK
- 89- “Li-ion dynamics in all solid-state batteries”, **Oral**, *SSI conference*, 16-21<sup>st</sup> June 2019 Pyeongchang, South Korea
- 90-“Achieving low Area Specific Resistance in Na metal All-Solid-State Batteries: the importance of surface chemistry at the Na metal / NaSICON interface”, **Poster** *SSI conference*, 16-21<sup>st</sup> June 2019 Pyeongchang, South Korea
- 91- “Understanding the factors affecting the performance of metal-solid interfaces with surfaces analysis techniques”, **Oral**, *ICE conference*, July 14-19<sup>th</sup> 2019 Lausanne, Switzerland
- 92- “The dynamic Li-solid electrolyte interface” **Invited Oral** *ECEE ECS*, 21-26th July 2019, Glasgow, UK.
- 93- “Chemical and electrochemical degradation in metal anode/solid-electrolyte interfaces for solid state batteries“ **Invited Oral** E-MRS 2019 Fall Meeting, 16-19th September 2019, Warsaw, Poland
- 94- HITESEA Workshop, **Invited Oral** “Quantification of oxygen dynamics in passivated surfaces of perovskites due to strontium segregation”, ICV-CSIC, 29-30 January, Madrid, Spain
- 95- The Power of Interfaces: Fundamentals for Solid State Devices, **Invited Oral** “Understanding the Factors Governing the Performance of Garnet Electrolytes in Li Metal” Royal Society, 10-11<sup>th</sup> March 2020, London UK

### **Organisation of international conferences:**

- 9<sup>th</sup> International Conference on Electroceramics, ICE2019, 15-19<sup>th</sup> July 2019, Lausanne, Switzerland. Organisation of “Solid State Batteries” symposium
- The Electrochemical Society ECEE, Electrochemical Conference on Energy and Environment: Bioelectrochemistry and energy storage, 21-26th July 2019, Glasgow, UK. Organisation of “Metal anodes meet solid electrolytes” symposium
- Spring MRS Meeting 2020, 25-29<sup>th</sup> May 2020, Strasbourg, France. Organisation of “Solid State Ionics” symposium

### **Teaching activities**

#### **Delivery and development of education at graduate and undergraduate level**

*Electroceramic course*, 4<sup>th</sup> year Master Degree “Advanced Materials Science and Engineering” (14h/year, 2014-present)

*Defects in ionic crystals*, 1<sup>st</sup> year undergraduate degree, (12+6h/year, 2015-2019).

*Literature Review*, (10h/year, 2016-present) and *Case study* (12h/year, 2016-present)

Materials for fuel cells, CSIC Master Course “Frontiers in material science” (2010-2011)

**Undergraduate supervision** Meng/MSc research projects since 2015 (6 per year), Personal tutor (mentorship and tutor of 6 undergraduates per year)

#### **PhD examiner:**

- Chemistry Department, University of Cambridge, June 2015,
- Universidad Autonoma de Madrid, October 2015
- Universidad Autonoma de Barcelona, January 2016
- Earth Science and Engineering Department, Imperial College London, August 2016
- University College London, December 2016
- Universidad del Pais Vasco, December 2016
- Department of Materials, Imperial College London, June 2017
- Universidad del Pais Vasco, September 2017
- Department of Materials, Oxford University, February 2018

- Department of Materials, Imperial Collge London, November 2018
- Department of Materials, Oxford University, December 2018
- Chemistry Department, University of Cambridge, April 2019
- Chemistry Department, University of Cambridge, October 2019

### **Research students and staff supervised**

So far, **I have successfully graduated 5 PhD students:**

1- Dr Ruben Martinez-Coronado “Electrodes for intermediate temperature SOFC”. 3<sup>rd</sup> December 2012. Supervisors: Jose Antonio Alonso (1<sup>st</sup>) and Ainara Aguadero (2<sup>nd</sup>). **Best PhD thesis award** Universidad Autonoma de Madrid.

2- Dr Celeste van den Bosch “Tuning the redox behaviour of (La,Sr)0.5(Mn,Co)0.5 thin films”. 12<sup>th</sup> December 2017. Supervisors: Ainara Aguadero (1<sup>st</sup>) and Stephen Skinner (2<sup>nd</sup>). Imperial College London

3- Dr Rowena Brugge “Optimisation of garnet electrolytes in solid state Li-batteries”. 17<sup>th</sup> July 2018. Supervisors: Ainara Aguadero (1<sup>st</sup>) and John Kilner (2<sup>nd</sup>). **Best PhD in energy materials award**. Imperial College London

4- Dr Duke Shih “Na0.5Ti0.5BiO3 solid electrolytes”. 27<sup>th</sup> June 2018. Supervisors: Stephen Skinner (1<sup>st</sup>) and Ainara Aguadero (2<sup>nd</sup>). Imperial College London

5- Dr Mudasir Yattoo “Ruddlesden-Popper phases as intermediate temperature cathodes for SOFC”. 10<sup>th</sup> October 2019. Supervisors: Stephen Skinner (1<sup>st</sup>) and Ainara Aguadero (2<sup>nd</sup>). Imperial College London

At the moment, **I am supervisor of 6 PhD students**, 3 as main supervisor (Edouard Querel, George Wilson, Nomaan Nabi) and 3 as secondary supervisor (Chen-Yu Tsai, Liam Yasim and Daisy Thornton).

**In the last 5 years I have been the line manager and main supervisor of 5 Postdocs and Fellows and 1 research officer:** Dr Ola Hekselman (September 2016-September 2017), Dr Federico Pesci (February 2017- Present), Dr Andrea Cavallaro (April 2019-Present), Dr Rowena Brugge (Sep 2018-Present), Dr Zhonghao Shen (January 2019-Present), Dr Richard Chater (Research officer, March 2015-m Present)

Furthermore, I am *co-supervising*: Dr Nina Meddings, Shared PDRA from Faraday Multiscale modelling project with Dr Sam Cooper from the Dyson Schoo and Dr Ozden Celikbilek, Marie Curie Fellow with Prof. Stephen Skinner

### **Management and administration activities**

**Postdocs and Fellows Champion**, Department of Materials, Imperial College London (2016-present). Mentor of postdoc and fellow in the department, coordination of scientific and professional and personal development activities The work that I do with the team of PDRA representatives has been acknowledged with the “*runner-up best team award 2018*” and the “*best team award 2019*” from the Postdocs and Fellows Development Centre at Imperial College.

**Member of the Equality & Diversity, Management and Research Committee** at the Department of Materials, Imperial College.

**Champion of the surface analysis and lab manager of isotope exchange lab** Department of Materials, Imperial College London

**Scientific Board Member Energy Materials group, IOM3** (2017-present)

**Member of the scientific committee for the Energy Storage SuperStore hub** (2015-2018)

**Member of the scientific committee for the H2FC Supergen hub** (2014-present)

**Member at large of the High Temperature Materials Division, Electrochemical Society** (2016-present)

**Guest editor** for Journal of Electrochemical Society, special issue “Advances in understanding the oxygen reduction and evolution reactions for high temperature energy conversion and storage”.

**Reviewer for scientific and governmental bodies:** National Authority for Scientific Research of Romania (ANCS), Agence Nationale de la Recherche (ANR), Swiss National Science Foundation (SNSF), European Research Council (starting and consolidator grants), Royal Society (University Research Fellowships).

**Frequent Referee** Nature Communications, Advance Materials, Scientific reports, Chemistry of Materials, J. Material Chemistry, Dalton, Journal of Power Sources, Int. Journal of Hydrogen Energy, Solid State Ionics etc.

**Memberships of scientific societies**

Royal Society of Chemistry (MRSC), Materials Society, Electrochemical Society (Member at large of the High Temperature Materials Division), Professional Grad IMMM of IOM3

**Outreach activities**

- Participation in open days at Imperial College (2019- present)
- Admission talks/interviews for prospective students (2016-present)
- Featured in the Royce Institute Women in engineering day, 2019
- Featured at the corporate partnership Imperial College website, 2018.
- Participation in interviews from the Department of Materials and "I, Science: Coffee+Chat. Videos showcased in YouTube.
- Energy Showcase-Energy Futures lab, November 2019. Showcase of the work Imperial is doing in the energy sphere. The event was part of an evening event with staff, students, sponsors, governmental organisations, funding bodies, alumni and Imperial's leadership all being invited.
- Involvement in the organisation of outreach activities through H2020 FETPTOACT program in Europe. We have developed a briefcase with different activities including demonstrators and games, explaining how a fuel cell, battery, photovoltaic cells and thermoelectric work. We are also planning to participate in the next Great Exhibition Road Festival 2020
- Advertisement of science and research activities through Twitter (@AinaraAguadero) and web page ([www.theaguaderos.com](http://www.theaguaderos.com))