Curriculum Vitae: Michael I. Ojovan

378 peer-reviewed publications, 15 monographs, 26 book chapters, 42 patents and 21 IAEA documents. *h*-index 29, data on: https://www.scopus.com/authid/detail.uri?authorId=57215020473
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PERSONAL DETAILS

Nationality: British

Address: *Department of Materials, Imperial College London, Royal School of Mines, South Kensington Campus, Exhibition Road, London, SW7 2AZ, UK*

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EMPLOYMENT

2011 – date Professor, Department of Materials, Imperial College London, UK;

2011 – 2018 Nuclear Engineer, Department of Nuclear Energy, International Atomic Energy Agency, Vienna, Austria

2002 – date Associate Reader, Department of Materials Science and Engineering, The University of Sheffield, UK

1982 – 2002 Deputy Director, Applied Research Centre, Moscow Scientific and Industrial Association RADON, Russia

EDUCATION

1994-1994 DSc: Surface effects in nuclear wasteforms,
Moscow Scientific Research Institute of Physical Chemistry

1979-1982 PhD: Interaction of radiation with small particles
National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)

1972-1979 MSc. Honours
National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)

PROFESSIONAL INTERESTS

Materials science applied to Nuclear waste management and Earth investigation

- Nuclear waste processing and immobilisation technologies including low temperature (compaction), high-temperature (incineration and plasma), and thermochemical methods;
- Design and processing of metallic, glass, glass composite and ceramic materials for nuclear waste immobilisation;
- Design and utilisation of nuclear waste processing facilities including incinerators, cementation, bituminisation, vitrification, and metal matrix immobilisation mobile and modular units;
- eLearning and taught courses on nuclear waste processing, storage and disposal;
- Performance assessment models for near-surface and deep geological disposal of radioactive wastes;
- Aqueous corrosion of metal, glass, glass composite and ceramic wasteforms relevant to disposal of radioactive wastes;
- Long term performance and radiation-induced effects in glasses relevant to use of materials in nuclear installations and waste immobilisation;
- Weathering of containers and nuclear wasteforms in environmental conditions;
- Off gas purification systems and treatment of radioactive gaseous waste;
- Physical chemistry of amorphous oxide materials and glass-liquid transition;
- Viscous flow and viscosity of amorphous materials;
- Geophysics of heat-generating self-sinking capsules to probe the Earth mantle within Moho project;
- Physical chemistry of metastable and strongly excited systems (Rydberg states) and Rydberg matter.

RESEARCH LEADERSHIP AND HIGHLIGHTS

Research leadership. Ojovan has been Nuclear Engineer at Departments of Nuclear Energy of International Atomic Energy Agency, which is the world's centre of cooperation in the nuclear field. He oversaw utilisation of predisposal technologies in Member States and led IAEA national and regional projects focused on SNF, HLW, ILW, and LLW. He directed numerous international consulting meetings, workshops, expert missions and training courses including events focused on characterisation of nuclear waste, off-gas treatment, utilisation of vitrification, cementation and use of geopolymers, safety and performance assessment modelling, incineration and plasma treatment.

Ojovan has launched and led the International Network on Predisposal management of Radioactive waste – the International Predisposal Network: IPN PUBLIC. He has established and co-led the International Project on Irradiated Graphite Processing GRAPA and the IAEA Benchmarking System for Operational Waste from WWER Reactors BMS.

Ojovan has co-director of several Joint ICTP-IAEA Workshops at the Abdus Salam International Centre for Theoretical Physics in Trieste, Italy including the Workshop on radiation effects in nuclear waste forms RadDam, Fundamental of Vitrification Glass Transition and Schools on Actinides Immobilisation Actinide Immo. and Nuclear Waste Vitrification Waste Vitrification

Ojovan has supported waste vitrification technologies at Immobilisation Science Laboratory in the University of Sheffield where he was focused on scientific research to underpin UK nuclear sector. Among projects that he led there were deployment of glass composites to immobilise difficult waste streams (problematic waste), cementitious materials in waste management and irradiated graphite treatment, and novel acoustic emission wasteform monitoring.

Ojovan has established in 2005 and led till 2010 the Nuclear Waste Management Module (#10) including the eLearning part at the Nuclear Technology Education Consortium of UK (NTEC).

Ojovan led the establishment and sustainable growth of Applied Research Centre (now Technology Development Centre, TDC) including the IAEA-supported Training and Education Department at Moscow SIA RADON (now FGUP RADON) from 1982 to 2002.

Scientific highlights. In collaboration with Professors Pavel Poluektov, Edward Manykin and Leif Holmlid, Ojovan has developed the concept and theoretical basis of Rydberg matter – a condensed state of highly-excited atoms and molecules recently noted by the President of Russian Academy of Sciences Vladimir Fortov as a great scientific event.

In collaboration with Professors F.G.F. Gibb and P.P. Poluektov, Ojovan has developed the concept of self-sinking capsules to investigate Earth deep layers including the Moho discontinuity and the Earth mantle.

In collaboration with Professors R.J. Hand and W.E. Lee, Ojovan devised the configuron percolation theory (CPT) of glass transition which explained the kinks of thermodynamic parameters at glass transition. He has also devised the universal viscosity equation (Sheffield model) valid for both melts and glasses.

In collaboration with Professor G.A. Petrov, Ojovan has developed a novel technological thermochemical treatment (TTT) approach with selective immobilisation of radionuclides.

Ojovan supported development and application of metal matrix immobilisation technology for highly radioactive and long-lived sealed radioactive sources which is industrially used since 1986 and was recommended by IAEA. Ojovan pioneered the utilisation of glass composite materials (GCM) in nuclear waste vitrification which was then industrially deployed in Russia and France.

Ojovan led the programme of long-term natural (field) tests of nuclear waste forms including cements, bitumen and vitreous materials. He has proved the high-durability of high-sodium borosilicate glasses for operational NPP radioactive waste immobilisation. In collaboration with PNNL and SRNL (A. Gore – V. Chernomyrdin programme), Ojovan validated the US code STORM for vitrified high-sodium waste of Hanford site in US. He has also contributed to establishment of the current state of the art understanding of borosilicate glass corrosion mechanisms in near-surface ground waters.

Public engagement highlights. Ojovan is an accomplished media commentator on nuclear energy and nuclear waste, providing authoritative comment to IAEA web site (e.g. IAEA link), Atomic Energy RU portal (e.g. About IPN), newspapers (POISK), RIA NOVOSTI (e.g. INTERVIEW), and others.

ADVISORY & CONSULTANCY ROLES

- Associated Reader in Materials Science and Waste Immobilisation at the University of Sheffield, https://www.sheffield.ac.uk/materials/about/staff/academic/mojovan, Leading Scientist at Moscow State University named after M.V. Lomonosov, http://istina.msu.ru/profile/Ojovan/ , and Leading Scientist at IGEM RAS, Institute of Geology of Ore Deposits, Petrography, Mineralogy and Geochemistry of Russian Academy of Sciences
- Chief Editor of journal “Science and Technology of Nuclear Installations” https://www.hindawi.com/journals/stni/editors/

- Associate Editor of journals *Frontiers in Nuclear Engineering*, *International Journal of Applied Glass Science*, and *Innovations in Corrosion and Materials Science,* and Editorial Board Member of *npj Materials Degradation, Materials, Sustainability* and *Journal of Nuclear Materials*.
- Scientific Advisory Board for numerous Waste Management Symposia, MRS-Scientific Basis for Nuclear Waste Management, NUWCEM, ICEM, and IT-3 Conferences.
- Technical Committee on Nuclear and Hazardous Waste Vitrification of the International Commission on Glass.
- Consultancy: DOE (US), Environment Agency (UK), NUMO (Japan), KAERI (Korea), ROSATOM (RF), CIAE (China), Morgan Molten Metal Systems, and others.

SELECTED GRANTS HELD

Acoustic emission analysis to characterise radioactive waste immobilising materials (PI) *BNFL plc.,*	2003-04	£84,690
NTEC Core module development and delivery (PI), *Nuclear Technology Education Consortium*	2005-10	£35,727
Ceramic waste forms for actinide immobilization (PI), *Royal Society*	2006-08	£24,000
Behaviour of Cementitious Materials in Long-Term Storage and Disposal (PI), *IAEA NE*	2007-10	€160,125
Feasibility study on monitoring of radiation-induced nanoscale acoustic emission (PI) *EPSRC*	2008-09	£80,029
Doctoral Training Centre for nuclear fission research, science and technology (CI) *EPSRC*	2009-17	£7,063,271
Strengthening Radioactive Waste Management Capabilities (PI), *IAEA TC*	2011-15	€632,979
Enhancing Radioactive Waste Management Capabilities (co PI), *IAEA, TC*	2016-19	€1,565,000

RELEVANT RECENT PUBLICATIONS

Selected Journal Publications

1. ***On structural rearrangements during the vitrification of molten copper***. Ojovan, M.I.; Louzguine-Luzgin, D.V. Materials **15**, 1313, 10 pp. (2022).
2. ***On structural rearrangements near the glass transition temperature in amorphous silica.*** Ojovan, M.I., Tournier R.F. Materials, **14**, 5235, 19 pp. (2021).
3. ***Revealing structural changes at glass transition via radial distribution functions***. M.I. Ojovan, D.V. Louzguine-Luzgin. J. Phys. Chem. B, **124** (15), 3186-3194 (2020).
4. ***Glass transition criterion and plastic deformation of glass***. D.S. Sanditov, M.I. Ojovan, M.V. Darmaev. Physica B, **582**, 411914 (2020).
5. ***Ceramic mineral waste-forms for nuclear waste immobilization***. A.I. Orlova, M.I. Ojovan. Materials, **12** (16), 2638, 45 pp. (2019).
6. ***Radiation-induced microcrystal shape change as a mechanism of wasteform degradation.*** M.I. Ojovan, B.E. Burakov, W.E. Lee. J. Nucl. Mater., **501C,** 162-171 2018).
7. ***Modelling aqueous corrosion of nuclear waste phosphate glass***. P.P. Poluektov, O.V. Schmidt, V.A. Kascheev, M.I. Ojovan. J. Nucl. Mater., **484**, 357–366 (2017)
8. ***Mass spectrometric evidencing on modified random network microstructure and medium range order in silicate glasses***. M.I. Ojovan. J. Non-Cryst. Solids, **434**, 71-78 (2016).
9. ***MoO_3 incorporation in magnesium aluminosilicate glasses.*** S. Tan, M.I. Ojovan, N.C. Hyatt, R.J. Hand. J. Nucl. Mater., **458**, 335-342 (2015).
10. ***Thermodynamic parameters of bonds in glassy materials from shear viscosity coefficient data***. M.I. Ojovan. International Journal of Applied Glass Science, **5**, (1) 22–25 (2014),

Selected Monographs

1. ***Sustainability of Life Cycle Management for Nuclear Cementation-Based Technologies***. R.O. Abdel Rahman, M.I. Ojovan. Elsevier, Woodhead Publishing, 654 p. (2021).
2. ***Materials for Nuclear Waste Immobilization***. M.I. Ojovan, N.C. Hyatt. MDPI, Basel, 220 p. (2020).
3. ***An Introduction to Nuclear Waste Immobilisation***, M.I. Ojovan, W.E. Lee, S.N. Kalmykov. Elsevier, Amsterdam. 1st Edition (2005), 2nd Edition (2014), 3rd Edition (2019).
4. ***Cementitious Materials for Nuclear Waste Immobilization***. R.O. Abdel Rahman, R.Z. Rahimov, N.R. Rahimova, M.I. Ojovan. Wiley, Chichester (2015).
5. ***Radioactive Waste Management and Contaminated Site Clean-up: Processes, Technologies and International Experience***, W.E. Lee, M.I. Ojovan, C.M. Jantzen. Woodhead, Cambridge (2013).
6. ***Handbook of Advanced Radioactive Waste Conditioning Technologies***. M.I. Ojovan. Woodhead, Cambridge (2011).
7. ***Crystalline Materials for Actinide Immobilisation***, B.E. Burakov, M.I Ojovan, W.E. Lee. Imperial College Press, London (2010). Translated to Chinese in 2021.