

Mario Aparicio

Senior Scientist

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[Consejo Superior de Investigaciones Científicas \(CSIC\)](#)

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Education

Master in Fuel Cell and Supercapacitors, [Consejo Superior de Investigaciones Científicas \(CSIC\)](#) (2003)

PhD Inorganic Chemistry, [Universidad Autónoma de Madrid](#) (1998)

BSc Chemistry, Universidad Complutense de Madrid (1991)

Former positions

Ramón y Cajal Research Fellow, [Instituto de Cerámica y Vidrio \(CSIC\)](#) (Spain) (2005-7)

I3P-CSIC Research Fellow, [Instituto de Cerámica y Vidrio \(CSIC\)](#) (Spain) (2002-4)

Post-doc CSIC, [Instituto de Cerámica y Vidrio \(CSIC\)](#) (Spain) (2001-2)

Post-doc Ministerio de Ciencia y Educación (Spain), Department of Ceramic and Materials Engineering, Rutgers University, New Jersey (USA) (1999-2001)

Pre-doc CSIC, [Instituto de Cerámica y Vidrio \(CSIC\)](#) (Spain) (1994-8)

Head of materials laboratory, CEMOSA, Ingeniería y control (Madrid, Spain) (1991-4)

Research interests

My expertise is based on the implementation of the sol-gel method for the synthesis of inorganic materials (glassy and crystalline) and organic-inorganic hybrid materials as coatings and membranes for various applications: electrolytes for Proton Exchange Membrane Fuel Cells (PEMFC), electrodes and electrolytes for Li-ion batteries, corrosion protection of metals and alloys, and oxidation protection at high temperature of carbon based ceramic composites. The characterization of processed material includes structural (FT-IR, UV-Vis, RBS, XPS, ToF-SIMS, etc.) and electrochemical characterization (CV, polarization, EIS, etc.).

Memberships

Sociedad Española de Cerámica y Vidrio (SECV)

The International Society of Electrochemistry (ISE)

Selected publications

Handbook of Sol-Gel Science and Technology, Processing, Characterization and Applications

L. Klein, M. Aparicio, A. Jitianu. Second Edition, Springer, 2018, ISBN: 978-3-319-19454-7 (Print) 978-3-319-19454-7 (Online).

Sol-Gel Processing for Conventional and Alternative Energy

M. Aparicio, A. Jitianu, L. C. Klein. Springer, 2012, ISBN: 978-1-4614-1956-3. Series: "Advances in Sol-Gel Derived Materials and Technologies", Series Editors: Michel A. Aegerter, Michel Prassas.

Infiltration of 40SiO₂-40P₂O₅-20ZrO₂ sol-gel in sSEBS membranes for PEMFCs application

P.G. Escribano, C. del Río, E. Morales, M. Aparicio, J. Mosa, Journal of Membrane Science 551 (2018) 136-144.

Thickness-properties synergy in organic-inorganic consolidated melting-gel coatings for protection of 304 stainless steel in NaCl solutions

M. Aparicio, A. Jitianu, G. Rodriguez, K. Al-Marzoki, M. Jitianu, J. Mosa, L. C. Klein, Surface & Coatings Technology 315 (2017) 426-435.

Covalent silica-PEO-LiTFSI hybrid solid electrolytes via sol-gel for Li-ion battery applications

J.F. Vélez, M. Aparicio, J. Mosa, Electrochimica Acta 213 (2016) 831-841.

Corrosion Protection of AISI 304 Stainless Steel with Melting Gel Coatings

M. Aparicio, A. Jitianu, G. Rodriguez, A. Degnah, K. Al-Marzoki, J. Mosa, L. C. Klein. Electrochimica Acta 202 (2016) 325-332.

Sulfonic acid-functionalized hybrid organic-inorganic proton exchange membranes synthesized by sol-gel using 3-mercaptopropyl trimethoxysilane (MPTMS)

J. Mosa, A. Durán, M. Aparicio, Journal of Power Sources 297 (2015) 208-216.

Li₄Ti₅O₁₂ thin-film electrodes by in-situ synthesis of lithium alkoxide for Li-ion microbatteries

J. Mosa, M. Aparicio, K. Tadanaga, A. Hayashi, M. Tatsumisago, Electrochimica Acta 149 (2014) 293-299.

Nanocrystalline mesoporous LiFePO₄ thin-films as cathodes for Li-ion microbatteries

J. Mosa, M. Aparicio, A. Durán, C. Laberty-Robert, C. Sanchez, Journal of Materials Chemistry A 2 (2014) 3038-3046.

Li₄Ti₅O₁₂ thin-film electrodes by sol-gel for lithium-ion microbatteries

J. Mosa, J.F. Vélez, J.J. Reinoso, M. Aparicio, A. Yamaguchi, K. Tadanaga, M. Tatsumisago, Journal of Power Sources 244 (2013) 482-487.

Film-shaped sol-gel Li₄Ti₅O₁₂ electrode for lithium-ion microbatteries

J. Mosa, J.F. Vélez, I. Lorite, N. Arconada, M. Aparicio, Journal of Power Sources 205 (2012) 491-494.

Epoxy-polystyrene-silica sol-gel membranes with high proton conductivity by combination of sulfonation and tungstophosphoric acid doping

J. Mosa, A. Durán and M. Aparicio, Journal of Membrane Science 361 (2010) 135-142.

Electrochemical techniques for practical evaluation of corrosion inhibitor effectiveness. Performance of cerium nitrate as corrosion inhibitor for AA2024T3 alloy

N.C. Rosero-Navarro, M. Curioni, R. Bingham, A. Durán, M. Aparicio, R.A. Cottis, G.E. Thompson, Corrosion Science 52 (2010) 3356-3366.

Proton conducting sol-gel sulfonated membranes produced from 2-allylphenol, 3-glycidoxypropyl trimethoxysilane and tetraethyl orthosilicate

J. Mosa, A. Durán and M. Aparicio, Journal of Power Sources 192 (2009) 138-143.

Effects of Ce-containing sol-gel coatings reinforced with SiO₂ nanoparticles on the protection of AA2024

N. C. Rosero-Navarro, S. A. Pellice, A. Durán and M. Aparicio, Corrosion Science 50 (2008) 1283-1291.

Synthesis and characterization of P₂O₅-ZrO₂-SiO₂ membranes doped with tungstophosphoric acid (PWA) for applications in PEMFC

J. Mosa, G. Larramona, A. Durán and M. Aparicio, Journal of Membrane Science 307 (2008) 21-27.

Synthesis and characterisation of proton conducting styrene-co-methacrylate/silica sol-gel membranes containing tungstophosphoric acid

M. Aparicio, Y. Castro and A. Durán, Solid State Ionics 176 (2005) 333-340.

Synthesis and characterization of Nafion/60SiO₂-30P₂O₅-10ZrO₂ sol-gel composite membranes for PEMFCs

M. Aparicio and L. C. Klein. Journal of the Electrochemical Society 152 [3] (2005) A493-A496.

Proton conducting methacrylate - silica sol-gel membranes containing tungstophosphoric acid

M. Aparicio, J. Mosa, M. Etienne and A. Durán, Journal of Power Sources 145 (2005) 231-236.

Preparation and characterization of cerium doped silica sol-gel coatings on glass and aluminium substrates

A. Pepe, M. Aparicio, S. Ceré and A. Durán, Journal of Non-Crystalline Solids 348 (2004) 162-171.

Characterization of $\text{SiO}_2\text{-P}_2\text{O}_5\text{-ZrO}_2$ sol-gel / NafionTM composite membranes

M. Aparicio, F. Damay and L. C. Klein, Journal of Sol-Gel Science and Technology 26 (2003) 1055-1059.

Yttrium silicate coatings for oxidation protection of carbon-silicon carbide composites

M. Aparicio and A. Durán. Journal of the American Ceramic Society 83 [6] (2000) 1351-1355.

Thick sol-gel coatings based on $\text{B}_2\text{O}_3\text{-SiO}_2$ system

M. A. Villegas, M. Aparicio and A. Durán, Journal of Non-Crystalline Solids 218 (1997) 146-150.