



**Balint Ioan**

Senior researcher

*Scientific secretary*

***Institute of Physical Chemistry of Romanian Academy***

***"Ilie Murgulescu"***

Spl. Independentei 202, 060021 Bucharest, Romania

Tel: (40) 21-638 53 70, Fax: (40)-21-312 11 47;  
email: [ibalint@icf.ro](mailto:ibalint@icf.ro)

**Research interests**

❖ ***Surface Science***

- non-isothermal gas desorption kinetic from supported-metal catalysts;
- solid defect chemistry;
- water-gas shift reaction on surface of simple and doped ionic oxides.

❖ ***Material synthesis***

- mesoporous nano oxides;
- mono/bimetallic metal nanoparticles.

❖ ***Catalysis***

- catalytic combustion of hydrocarbons;
- oxidative coupling of methane;
- hydrogenation and oxidative conversion of conversion hydrocarbons;
- deNO<sub>x</sub> reaction;
- structure-sensitive reactions;
- nitrate and nitrite abatement.

❖ ***Photocatalysis / light harvesting***

- water and air depollution;

- water splitting;
- light-induced reactive oxygen species generation;
- dye sensitized solar cells.

### **Research experience / Scientific Stages**

- Unesco Fellowship, Tokyo Institute of Technology, Japan (1991-1992)
- Invited professor, Tokyo Institute of Technology (1997 - 1998; 1999-2000)
- Post-doc fellowship, University Pierre et, Paris, France (1998-1999).
- JSPS post-doc fellowship, Tokyo Institute of Technology, Japan (2000-2002)
- Grant in Aid from Scientific Research from the Ministry of Education, Culture and Sport, Science and Technology, Tokyo Institute of Technology, Japan (2002-2005)

### **Patents (selected)**

➤ "*Catalyst and treatment procedure for treatment of waters impurified with nitrates and chlorinated organic compounds*", Patent nr. 132035 B1/ 29.11.2019.

### **Independent evaluator expert**

- EU Research Program FP7-NMP-SMALL-1 : 2.2-3 "*Advanced Materials Architectures for Energy conversion*", 2007.
- EU Research Program FP7-ENERGY-NMP-2008-1: "*Novel materials for energy application*", 2008.
- EU Research Program FP7-NMP-2008-SMALL-2, NMP-2008-1.2-3 "*Development of technologies for the controlled combustion of nanoparticles*".

### **Academic awards**

Academic award for chemical research *Nicolae Teclu* (1987) for scientific contribution on the topic: "*Catalytic sensors for combustible gas detection*".

## **Books**

- ✓ “*Nanocrystal dispersed platinum particles: preparation and catalytic properties*” Encyclopedia of nanoscience and nanotechnology, Editors: J. A. Schwarz C. Contescu and K. Putyera, Publisher: Marcel Dekker Inc., 2004, pp 2259-2268.
- ✓ “Leading Edge Catalysis Research; "Preparation of nanodispersed Ru Supported on  $\gamma$ -  $\text{Al}_2\text{O}_3$  and its Catalytic Activity for ammonia synthesis and for methane oxidative conversion” Editors: Lawrence P. Bevy; Publisher: Nova Science Publishers, Inc., 2006, pp 98-128. ISSN 1-59454-496-4.
- ✓ “*Metal nanoclusters in catalysis and material science; The issue of size control*”; Part B (Methodologies), Chapter 16, "Synthesis of morphologically controlled Pt nanoparticles and their application in catalytic reactions" Editors: B. Corain, G. Schmid, and N. Toshima, Elsevier 2008, pp 301-305, ISBN-13: 978-0-444-53057-8.
- ✓ “*Purification of waste water using alumina as catalysts support and as an adsorbent*” in *Waste Water*”, Edited by F. S. G. Einshlag, INTECH, Vienna, Austria, pp 277-298 (2011).
- ✓ “*SiO<sub>2</sub>-Based Materials for Immobilization of Enzymes*” Nanomaterials - Toxicity, Human Health and Environment, IntechOpen\_2019. DOI: <http://dx.doi.org/10.5772/intechopen.87046>

## **Publications (selected)**

- Ioan Balint and Ken-ichi Aika, “*Interaction of water with 1% Li/MgO: dc conductivity of Li/MgO catalyst for methane selective activation*”, J. Chem. Soc. Faraday Trans., 91(12), 1805-1811 (1995).
- Ioan Balint and Ken-ichi Aika, “*The defect chemistry of lithium-doped magnesium oxide*”, J. Chem. Soc. Faraday Trans., 93, 1797-1801 (1997).
- Ioan Balint, Akane Miyazaki and Ken-ichi Aika, “*The alumina dissolution promoted by CuSO<sub>4</sub> precipitation*”, Chem. Mater., **11**(2), 378-383, 1999.

- Ioan Balint, Marie-Anne Springuel-Huet, Ken-ichi Aika and Jacques Fraissard, "*Evidence for oxygen vacancy formation in HZSM-5 at high temperature*", Phys. Chem. Chem. Phys., 1, 3845-3851, 1999.
- Ioan Balint and K. Aika, "*Temperature-programmed desorption study of water-gas shift and methane steam reforming reactions over Li/MgO catalyst*", Appl. Catal. A: General, 196(2), 209-215, 2000.
- Ioan Balint and Ken-ichi Aika, "*Specific defect sites creation by doping MgO with lithium and titanium*", Applied Surf. Sci., 173 (3-4), 296-306, 2001.
- Ioan Balint, Akane Miyazaki and Ken-ichi Aika, "*Alumina dissolution during impregnation with  $\text{PdCl}_4^{2-}$  in acid pH range*" Chem. Mater., 13(3), 932-938, 2001.
- Ioan Balint, Akane Miyazaki and Ken-ichi Aika, "*NO reduction by  $\text{CH}_4$  over well-structured Pt nanocrystals supported on  $\gamma\text{-Al}_2\text{O}_3$* " Chem. Lett., (10), 1024-1025, 2001.
- Akane Miyazaki, Ioan Balint, Ken-ichi Aika and Yoshio Nakano, "*Preparation of Ru nanoparticles supported on  $\gamma\text{-Al}_2\text{O}_3$  and its novel catalytic activity for ammonia synthesis*", J. Catal., 204, 364-371, 2001.
- Ioan Balint, Akane Miyazaki and Ken-ichi Aika, "*NO reduction by  $\text{CH}_4$  over well-structured Pt nanocrystals supported on  $\gamma\text{-Al}_2\text{O}_3$* ", Appl. Catal. B, 37 (3), 217-229, 2002.
- Ioan Balint, Akane Miyazaki and Ken-ichi Aika, "*Methane reaction with NO over alumina supported Ru nanoparticles*" J. Catal. 207 (1), 66-75, 2002.
- Ioan Balint, Akane Miyazaki and Ken-ichi Aika, "*Investigation of the morphology-catalytic reactivity relationship for the Pt nanoparticles supported on alumina by using the reduction of NO with  $\text{CH}_4$  as a model reaction*", Chem. Commun., (10), 1044-1045, 2002.
- Ioan Balint, Zhixiong You and Ken-ichi Aika, "*Morphology and oxide phase control in the microemulsion mediated synthesis of barium stabilized alumina nanoparticles*" Phys. Chem. Chem. Phys., 4, 2501 – 2503, 2002.

- Zhixiong You, Ioan Balint, and Ken-ichi Aika, “*Synthesis of thermally stable Cs-doped alumina nanoparticles by microemulsion method*”, Chem. Lett., (11), 1090-1091, 2002.
- Ioan Balint, Akane Miyazaki, Ken-ichi Aika, “*The relevance of Ru nanoparticles morphology and oxidation state to the partial oxidation of methane*”, J. Catal., **220** (1), 74-83, 2003.
- Ioan Balint, Akane Miyazaki and Ken-ichi Aika, “*Effect of platinum morphology on lean reduction of NO with C<sub>3</sub>H<sub>6</sub>*” Phys. Chem. Chem. Phys., 6 (9), 2000 – 2002, 2004.
- Zhixiong You, Ioan Balint, Ken-ichi Aika “*Catalytic combustion of methane over microemulsion-derived MnO<sub>x</sub>-Cs<sub>2</sub>O-Al<sub>2</sub>O<sub>3</sub> nanocomposites*” Applied Catalysis B: 53(4), 233–244, 2004.
- Ioan Balint, Akane Miyazaki, Ken-ichi Aika, “*On the kinetic and structure sensitivity of lean reduction of NO with C<sub>3</sub>H<sub>6</sub> over nanodispersed Pt crystals*” Appl. Catal. B, 59, 72-81, 2005.
- Akane Miyazaki, M. Asakawa, Ioan Balint, "Nitrite reduction on the morphologically controlled Pt nanoparticles" Chem. Com., 44, 3730-3732, 2005.
- Flori Papa, Luminita Patron, Oana Carp, Carmen Paraschiv, Balint Ioan “*Catalytic activity of neodymium substituted zinc ferrites for oxidative conversion of methane*” J. Mol. Catal., 299 (1-2), 93-97 (2009).
- Ioan Balint, Akane Miyazaki, “*Novel preparation method of well-defined mesostructured nanoaluminas via carbon-alumina composites*” Microporous Mesoporous Mater, 122, 216-222 (2009).
- Crina Anastasescu, Maria Zaharescu, Ioan Balint “*Unexpected photocatalytic activity of simple and platinum modified tubular SiO<sub>2</sub> for the oxidation of oxalic acid to CO<sub>2</sub>*” Catal. Lett., 132 (1-2), 81-86, (2009).
- Florica Papa, Dana Gingasu, Luminita Patron, Akane Miyazaki, Ioan Balint “*On the nature of active sites and catalytic activity for OCM reaction of alkaline-earth oxides-neodymia catalytic systems*” Appl. Catal. A, 375 (1), 172–178 (2010).

- Florica Papa, Patron Luminita, Petre Osiceanu, Ruxandra Barjega, Miyazaki Akane, Ioan Balint "*Acid-base properties of the active sites responsible for  $C_2^+$  and  $CO_2$  formation over  $MO-Sm_2O_3$  ( $M=Zn, Mg, Ca$  and  $Sr$ ) mixed oxides in OCM reaction*" J. Mol. Catal., 346 (2011) 46-54.
- Crina Anastasescu, Mihai Anastasescu, Maria Zaharescu, Ioan Balint, "*Platinum-modified  $SiO_2$  with tubular morphology as efficient membrane-type microreactors for mineralization of formic acid*" J. Nanoparticle Res., 14(10), 1198-1209, 2012.
- G. Dobrescu, F. Papa, R. State, I. Fangli, I. Balint "*Particle size distribution of Pt-Cu bimetallic nanoparticles by fractal analysis*" Powder Technol., 269 (2015) 532-540;
- Akane Miyazaki, Kahori Matsuda, Florica Papa, Mariana Scurtu, Catalin Negri, Gianina Dobrescu, Ioan Balint "*Impact of particle size and metal-support interaction on denitration behavior of well-defined Pt-Cu nanoparticles*" Catal. Sci. Technol., 5 (1), (2015) 492 - 503;
- C. Anastasescu, N. Spataru, D. Culita, I. Atkinson, T. Spataru, V. Bratan, C. Munteanu, M. Anastasescu, C. Negri, I. Balint "*Chemically assembled light harvesting  $CuO_x-TiO_2$  p-n heterostructures*" Chem. Eng. J., 281 (2015) 303-311;
- C. Anastasescu, M. Zaharescu, D. Angelescu, C. Munteanu, V. Bratan, T. Spataru, Catalin Negri, Nicolae Spataru, I. Balint "*Defect-related light absorption, photoluminescence and photocatalytic activity of  $SiO_2$  with tubular morphology*" Sol. Energy Mater. Sol. Cells 159 (2017) 325–335.
- R. N State; F. Papa; T. Tabakova; I. Atkinson; C. Negri; I. Balint "*Photocatalytic abatement of trichlorethylene (TCE) over Au and Pd-Au supported on  $TiO_2$  by combined photomineralization/hydrodechlorination reactions under simulated solar irradiation*" J. Catal., 346 (2017) 101–108.
- Crina Anastasescu, Catalin Negri, Daniel G. Angelescu, Irina Atkinson, Mihai Anastasescu, Nicolae Spataru, Maria Zaharescu and Ioan Balint "*Particularities of photocatalysis and formation of reactive oxygen species on insulators and semiconductors: cases of  $SiO_2$ ,  $TiO_2$  and their composite  $SiO_2-TiO_2$* "

Catalysis Sci. & Technol., 8 (2018), 5657-5668.

o S. Preda, C. Anastasescu, I. Balint, P. Umek, M. Sluban, C. Negrila, D. G. Angelescu, V. Bratan, A. Rusu, M. Zaharescu "Charge separation and ROS generation on tubular sodium titanates exposed to simulated solar light" Appl. Surf. Sci., 470, (2019) 1053-1063.

### **Research contracts (selected)**

✚ "Investigation of active centers formed in zeolites at high temperatures" Grant ANSTI nr. 5206 / 1999 - 2001 (project head);

✚ "Preparation of morphological controlled metal nanocrystals and their application for structure sensitive catalytic reactions" Grant CNCSIS nr. 724/2006 –2008, a research project with National Council of Scientific Research in Universities (project head);

✚ "Architectures of advanced materials with applications for the treatment of waste waters" Grant CNMP (National Center of Programs Management) -Program 4-Partenerhip in priority domains, 2008-2011 (project coordinator);

✚ "New bimetallic nanoparticles with applications for removal of chlorinated compound in water and for biosensors" Grant PN II, BICLEANBIOS 46/2012, 2012-2015. (project coordinator);

✚ "Advanced materials and laser/plasma processing technologies for energy and deppolution applications: increase of aplication potential and scientific interconnectivity in eco-nano technologies" Grant PCCDI 41/2018 "MALASENT"(project responsible).