

Curriculum Vitae of Simona Binetti

Academic Position

Simona Binetti is Associate Professor of Physical Chemistry at University of Milano-Bicocca (UNIMIB). Qualified Full Professor in Physical Chemistry,

- Vice Director of the Milano-Bicocca Solar energy research center –MIBSOLAR,
- Representative for UNIMIB in the steering committee of the Joint Program on photovoltaics of European Energy Research Alliance (EERA)
- Dean of Chemistry Courses at University of Milano Bicocca.

Education

She obtained a Master degree in Physics at University of Milan in 1991, Master in Material Science in 1994 with mark 70/70 cum laude and a Ph.D. in Chemistry in 1998.

Teaching

Since 2001, she has been teaching: Material Chemistry, Laboratory of Physical Chemistry III, Laboratory of Material Chemistry, Complement of Physical Chemistry, Physical Chemistry of Solid State and Surface, Materials and Devices for Energy. She is a member of the council of the PhD program in Materials Science and Nanotechnology of the University of Milano-Bicocca, and Delegate of the Dean of the Science Faculty for relationship and activity with Secondary Schools. She has been for 10 years the responsible of promotion activity of the Science School of University of Milano-Bicocca. She has been the advisor of three PhD students and four postdoctoral researchers and of more than 50 master thesis projects.

Research activity

Her research activity has been mainly devoted to the experimental study of the effect of defects (point and extended ones) on electrical and optical properties of elementary semiconductor (Silicon) and composed (Silicon Carbide, Silicon Germanium and Copper Indium Gallium Diselenide “CIGS” alloy and CZTS alloy) for PV applications. In this context she developed original research activities about the role of defects on the opto-electrical properties of silicon (solar grade, multicrystalline and nanocrystalline thin film) for photovoltaic application, of optical emission associated to dislocations and oxygen precipitates in silicon, on the epitaxial growth of Er-doped silicon for photonic application. Within this frame, the main experimental tools systematically used include UV-IR Photoluminescence systems down to 12 K, infrared and Raman spectroscopy, Hall effect system down to 12 K, the Light Beam Induced Current Technique. She knows all the main characterization methods to analyze the PV device performances, including spectral response/external quantum efficiency measurements and current/voltage characteristics under illumination by solar simulator. As far as concerns growth processes, she is performing studies on the deposition of Copper Indium Gallium Diselenide “CIGS” films and CZTS for PV application on glass and flexible substrate. In this frame an international patent for a innovative deposition system hybrid between sputtering and evaporation was deposited. The aim of this research is the development of low-cost inorganic PV thin films solar cells for BIPV and PIPV. Moreover, in this same context, several deposition methods (e.g. sputtering, evaporation, chemical bath deposition, spin coating from solution system) are under investigation.

Her research group currently includes one associate professor in Physics, three post-doctoral fellows, and one PhD student plus some undergraduate students; the main current scientific interests of the group are materials and devices for inorganic photovoltaics.

Scientific Publications

She has published 4 book chapters, 4 patents and more than 120 papers in peer and editor-reviewed international scientific journals (H index 19, citations 1103) ORCID Author ID: 7003698279 ; <http://orcid.org/0000-0002-8605-3896>.

She did more than 32 invited presentations mainly to PV international conferences .

National and international research projects

Since 1993, she has been involved ten European Photovoltaic Energy Projects or she has been the local coordinator of three of them

1990-1993 Multi-Chess I

1993-1996 Multi-Chess II

1996-1999 Cost Effective Solar Silicon Tecnology (COSST)

2000-2003 Fast in Line characterization tools for crystalline silicon material and cell process quality control in the PV industry (FAST-IQ)

2002-2005 N-type Solar Grade Silicon for Efficient p+n Solar Cells (NESSI)

2002-2005 Nanocrystalline silicon films for photovoltaic and optoelectronic applications (NANOPHOTO)

2005-2008 LOCAL COORDINATOR, “FOXY” (“Development of solar grade silicon feedstock for crystalline wafers and cells by purification and crystallisation”)

2009-2012 SOLAR DESIGN (On the Fly alterable thin film solar modules for design driven applications) FP7-NMP SME

2014-2018 LOCAL COORDINATOR CHEETACH project “Cost-reduction through material optimisation and Higher EnErgy output of solar pHotovoltaic modules - joining Europe’s Research and Development efforts in support of its PV industry “

2017-2019 LOCAL COORDINATORE OF RM@school EIT KIC Raw Materials

She has also been involved in many national projects since 2001:

PRIN 2001- 2003,

4 Cariplo Foundation Projects: 2005-2007 “Development of nanostructured electrodes for the production of hydrogen via the photoelectrochemical splitting of water” ; 2005-2008 “Tecnologie Epitassiali su Silicio per Elettronica e Optoelettronica” 2009-2012 “Transparent Polymer NANOcomposites with Tailorable Optical Properties: Fabrication and Characterization” ; 2011-2013 “QDs based solar cells grown by Droplet Epitaxy”)

LOCAL RESPONSIBLE Project n. 90 MISE-ICE.CRUI “Aumento dell'efficienza delle celle solari mediante modifica dello spettro solare dal 2008 al 2011

2 Regione Lombardia Projects:

2008-2010 Progetto BANDO MD 2008 “Celle Solari a Film sottile CuInGaSe₂: sviluppo di nuove tecnologie di deposizione e di strutturazione laser”

2012-2013 Progetti di ricerca industriale e sviluppo sperimentale nei settori strategici di Regione Lombardia e del MIUR “Celle solari CIGS a concentrazione”)

2014-2018 LOCAL RESPONSIBLE Italian Space Energy (ASI) project on a Silicon grown under microgravity related to an ESA (European Space Agency) project N° ESA AO-2009-LoI-0669

“Gravitational effects on heat and mass transport phenomena in directional solidification of upgraded metallurgical silicon for photovoltaic applications”

PRINCIPLE INVESTIGATOR of four contracts with private company in PV fields.

Editorial and reviewing activity:

Evaluator and Project Reviewer for EUROPEAN RESEARCH COUNCIL AGENCY (ERC) (FP7 “IDEAS”); Project reviewer for The Ministry of Science, Education and Sport of the Republic of Croatia; Project reviewer for Israel Science Foundation (ISF) (2013) Project reviewer for Italian Minister (MIUR) (2014) and Grant SIR 2014.

She is a referee for various international APS, AIP, IOP, ACS, and Elsevier journals. Examples include Nanotechnology, Solar Energy Materials and Solar Cells, IEEE Journal of Photovoltaics, Progress in PV, Surf. Sci., J. Appl. Phys. Material Science Engineering B, Thin solid films, Optical materials, (RRL) - Rapid Research Letters, Nanoscale Research Letters (NRL), ecc.
She has also been referee of different PhD thesis across Europe in PV Field.

She is a member of the Advisory Committee of different international conferences.

Major Scientific Collaboration

Energy research Centre of the Netherlands (ECN), Petten, The Netherlands, Dr. G. Coletti

ELKEM Solar, Kristiansand, Norway, Dr.ssa Anne Karim

University of Science and Technology (NTNU), Department of Materials Science and Engineering, Trondheim, Norway, Prof.ssa Marisa di Sabatino

Institute of Space and Astronautical Science/JAXA, Sagami-hara 252-5210, Japan, Prof. M. Tajima

School of Engineering, The Australian National University, Canberra, ACT 0200, Australia Prof. D. Macdonald

SINTEF Materials and Chemistry, Trondheim, Norway, Dr. Øvrelid Eivind

International Solar Energy Research Center Konstanz (ISC), Konstanz, Germany, Dr. Radovan Kopecek

Rudjer Boskovic Institute, Bijenicka Zagreb, Croatia, Prof. Branko Pivac

UNSW, Sydney, 2052, Australia, Dr. Ziv Hameirie