Marcel Di Vece

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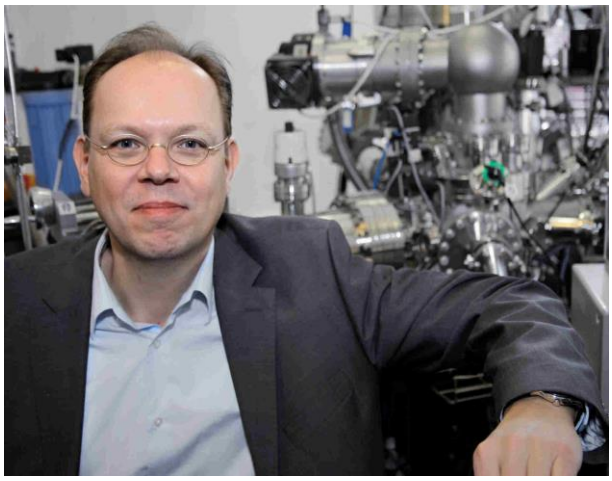

After my PhD in Physics in 2003 on the "Switchable mirror" at Utrecht University, The Netherlands, I obtained a rich international postdoctoral experience with an emphasis on nanoparticles. After working on various topics such as hydrogen storage and magnetism of nanoparticles I started my own research line with nanoparticles and light since 2010. The applied part of my current work involves nanoparticles for photovoltaics in which I am using (plasmonic) metal and semiconductor (quantum dot) nanoparticles to enhance light trapping in thin film solar cells. Besides this research in novel concept photovoltaics, I am also studying light-matter interaction from a more fundamental point of view. For this research I use a dedicated gas aggregation cluster source combined with a thin film sputter source, with which almost any nanoparticle-thin film composite can be fabricated.

Latest work experience

2016-Present — Tenure Track Associate professor, Department of Physics, Milano University, Italy

Nanoclusters for photovoltaics: I am investigating semi conducting particles as quantum confined building blocks for solar cells and plasmonic metal particles and dielectric Mie particles for enhanced light absorption strategies.

2015-2016 — Visiting professor, at Laboratorium voor Vaste stoffysica en Magnetisme, Katholieke Universiteit Leuven, Belgium

2010-2015 — Assistant professor, Nanophotonics-Physics of Devices, Utrecht University, The Netherlands

2010-2010 — Postdoctoral Fellow at Center for Individual Nanoparticle Functionality (CINF), Technical University of Denmark, Denmark

2009-2010 — Associate Research Scientist at Chemical Engineering, Yale University, USA, From September 2009 consultant at Argonne National Laboratory, USA

Education

1999-2003 — Ph.D. at Physics and Chemistry of Condensed Matter, Utrecht University, Netherlands, "*The metal hydride switchable mirror*"

Experimental techniques

Femto second Confocal Microscopy, Extended X-ray Absorption Fine Structure (EXAFS, ESRF (Grenoble), APS (Argonne)), Electrochemistry, XANES, XRD, GISAXS, STM, AFM, TEM,SEM, Vacuum techniques, Magnetron sputtering, Pulsed laser deposition (PLD), Optical absorption spectroscopy, Laser spectroscopy, TPR, Gas chromatography, Spectral response, solar simulator, FDTD simulations.

Current Teaching at UNIMI

Struttura della Materia 1 (CORSO A) Esercitazioni

Elettronica 1

Publications

Web of Science h-index = 18

Using Nanoparticles as a Bottom-up Approach to Increase Solar Cell Efficiency
Marcel Di Vece, KONA Powder and Particle Journal (2019)
Increasing the optical absorption in a-Si thin films by embedding gold nanoparticles
Gabriele Faraone, Ritika Modi, Sarita Marom, Alessandro Podestà and Marcel Di Vece, Optical Materials, 75, 204-210 (2018)
Wavelength Dependent Nonlinear Optical Properties of Ag Nanoparticles Dispersed in a Glass Host
Piero Ferrari, Sneha Upadhyay, Mikhail V. Shestakov, Jan Vanbuel, Bert De Roo, Yinghuan Kuang, Marcel Di Vece Victor Moshchalkov, Jean-Pierre Locquet, Peter Lievens, Ewald Janssens, accepted in J. Phys. Chem. C. (2017)
Very Long Plasmon Oscillation Lifetimes in the Gap Between Two Gold Particles
Marcel Di Vece, Plasmonics (2017)
Mechanical-optical-electro modulation by stretching a polymer-metal nanocomposite
Chloe Minnai, Marcel Di Vece, Paolo Milani, Nanotechnology, 28, 355702 (2017)
Improving optical absorption in a-Si thin films with TiO2 Mie scatterers
Giorgos Giannakoudakis and Marcel Di Vece, Eur. Phys. J. D, 71, 101 (2017)
Concepts for external light trapping and its utilization in colored and image displaying photovoltaic modules
Lourens van Dijk, Jorik van de Groep, Leon W. Veldhuizen, Marcel Di Vece, Ruud E.I. Schropp, Prog. Photovolt: Res. Appl. 25, 553–568, doi: 10.1002/pip.2863 (2017)
Exploration of external light trapping for photovoltaic modules
Lourens van Dijk, Jorik van de Groep, Marcel Di Vece, Ruud Schropp, Optics Express, 24, A1158 (2016)
Plasmonic Scattering Back Reflector for Light Trapping in Flat Nano-Crystalline Silicon Solar Cells
Lourens van Dijk, Jorik van de Groep, Leon W. Veldhuizen, Marcel Di Vece, Albert Polman, Ruud E.I. Schropp, ACS Photonics 3 (4), 685–691 (2016)

Shifting the Aluminum nanoparticle plasmon resonance to the visible with SiN and a-Si thin films
Thomas van der Vliet and Marcel Di Vece, Thin Solid Films, 603, 404-407 (2016)
Charging gold nanoparticles in ZnO by electric fields
M. Obradovic, M. Di Vece, D. Grandjean, K. Houben, P. Lievens, J. Phys.: Condens. Matter 28, 035303 (2016)
Luminescent tracks of high-energy photoemitted electrons accelerated by plasmonic fields
Marcel Di Vece, Giorgos Giannakoudakis, Astrid Bjørkøy, and Wingjohn Tang, Nanophotonics 4, 511–519 (2015)
Multipole plasmons and their disappearance in few-nanometre silver nanoparticles
Søren Raza, Shima Kadkhodazadeh, Thomas Christensen, Marcel Di Vece, Martijn Wubs, N. Asger Mortensen, Nicolas Stenger, **Nature Communications** 6, 8788 doi:10.1038/ncomms9788 (2015)
Understanding the Thermal Stability of Silver Nanoparticles Embedded in a-Si
Anna L. Gould, Shima Kadkhodazadeh, Jakob B. Wagner, C. Richard A. Catlow, Andrew J. Logsdail, and Marcel Di Vece, J. Phys. Chem. C.,119, 41,23767–23773 (2015)
3D-Printed External Light Trap for Solar Cells
Lourens van Dijk, Ulrich W. Paetzold, Gerhard A. Blab, Ruud E.I. Schropp, and Marcel Di Vece, Progress in Photovoltaics, DOI: 10.1002/pip.2702 (2015)
Optical response of silver nanoneedles on a mirror
Arjan Keeman, E. Stefan Kooij, Dick van Dam, Ruud E. I. Schropp, Marcel Di Vece Plasmonics, 10, 5, 1089-1096 (2015)
3D-printed concentrator arrays for external light trapping on thin film solar cells
Lourens van Dijk, E.A. Pepijn Marcus, A. Jolt Oostra, Ruud E.I. Schropp, Marcel Di Vece, Solar Energy Materials & Solar Cells 139, 19–26 (2015)
Formation and Photoluminescence of “Cauliflower” Silicon Nanoparticles
Wingjohn Tang, Joren J. Eilers, Marijn A. van Huis, Da Wang, Ruud E. I. Schropp, and Marcel Di Vece, J. Phys. Chem. C, 119, 20, 11042–11047 (2015)
Photoluminescence as a probe of the electrical charge dependence of gold nanoparticles
M. S. Obradovic, M. Di Vece, I. Asselberghs, D. Grandjean, K. Clays, P. Lievens, J. Nanosci. Nanotechnol. 15, 9766-9771 (2015)
Hydrogen-induced Ostwald ripening of cobalt nanoparticles on carbon nanotubes
Marcel Di Vece, Codruta Zoican-Loebick, Lisa D. Pfefferle, Journal of Nanoparticle Research, 16, 2234 (2014)
Elongated nanostructures for radial junction solar cells
Y Kuang, M Di Vece, J K. Rath, L van Dijk, and R.E.I. Schropp, Reports on Progress in Physics 106502 (2013)
Switching CdSe quantum dot luminescence with a-Si:H
M Di Vece, S N F van Duren, D J van den Heuvel, D Mitoraj,
Y Kuang, H C Gerritsen and R E I Schropp, Nanotechnology 24, 315202 (2013)
Plasmonic nano-antenna a-Si:H solar cell
M. Di Vece, Y. Kuang, S. van Duren, J.M. Charry, L. van Dijk and R.E.I. Schropp,
Optics Express, 20, 25, 27327 (2012)
Fabrication and characterization of nanorod solar cells with an ultrathin a-Si:H absorber layer
Y. Kuang, K.H.M. van der Werf, Z. S. Houweling, M. Di Vece, and R.E.I. Schropp, J. Non-Cryst. Solids, 358, 17, 2209 (2012)

Oxidative dehydrogenation of cyclohexene on size selected subnanometer cobalt clusters: improved catalytic performance via evolution of cluster-assembled nanostructures
S. Lee, M. Di Vece, B. Lee, S Seifert, R.E. Winans and S. Vajda, Phys Chem Chem Phys, DOI: 10.1039/C2CP40162B (2012)
Support-dependent Performance of Size-selected Subnanometer Cobalt Cluster-based Catalysts in the Dehydrogenation of Cyclohexene
S. Lee, M. Di Vece, B. Lee et al, ChemCatChem, 4,10, 1632 (2012)
Oxidative Dehydrogenation of Cyclohexane on Cobalt Oxide (Co3O4) Nanoparticles: The Effect of Particle Size on Activity and Selectivity
E.C. Tyo, C. Yin, M. Di Vece,et al. ACS Catalysis, 2, 11, 2409 (2012)
Quenching of TiO2 photo catalysis by silver nanoparticles
M. Di Vece, A. B. Laursen, L. Bech, C.N. Maden, M. Duchamp, R. V. Mateiu S. Dahl, I. Chorkendorff, J. of Photo. and Photobio. A: Chem. 230, 10 (2012)
Passivation of Co nanoclusters assembled thin films with hydrogen
C.P. Romero, A. Volodin, M. Di Vece, H. Paddubrouskaya, Huan Wang, A. Vantomme, C. Van Haesendonck and P. Lievens, Thin Solid Films, 520, 17, 5584 (2012)
Combined TPRx, in situ GISAXS and GIXAS studies of model semiconductor-supported platinum nanocatalysts in the hydrogenation of ethylene
S A. Wyrzgol, S. Schäfer, S. Lee, B. Lee, M. Di Vece, X. Li, S. Seifert, R. E. Winans, J. A. Lercher, M. Stutzmann, S. Vajda, Phys Chem Chem Phys, 12, 5585 (2010)
SiC: a photocathode for water splitting and hydrogen storage
D.H. van Dorp, N. Hijnen, M. Di Vece and J.J. Kelly, Angew. Chem. Int. Ed., 48, 6085 (2009)
Compositional changes of Pd-Au bimetallic nanoclusters upon hydrogen-exposure
M. Di Vece, S. Bals, J. Verbeeck, P. Lievens and G. Van Tendeloo, Phys. Rev. B, 80, 125420 (2009)
Three dimensional magnetization exchange coupling of Fe and V mixed nanoclusters affected by hydrogen
V. K. Valev, M. Di Vece*, M. Van Bael, D. Grandjean, S. Decoster, A. Vantomme, T. Verbiest, and P. Lievens, J. Appl. Phys. 105, 114907 (2009)
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M. Di Vece, B. Kolaric, K. Baert, G. Schweitzer, R. A. L. Vallée, P. Lievens, K. Clays, Nanotechnology, 20, 135203 (2009)
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Inhomogeneous phase transition upon hydrogenation of nanocluster Pd film
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Angular dependence of fluorescence emissionfrom quantum dotsinside a photonic crystal
K. Baert, B. Kolaric, W. Libaers, R.A.L. Vallee, M. Di Vece, P. Lievens and K. Clays, Res. Lett. Nano Tech., 974072 (2008)
Weighing Supported Nanoparticles: Size-Selected Clusters as Mass Standards in Nanometrology
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Three dimensional atomic-scale structure of size-selected gold nanoclusters
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Combining Theory and Experiment to Characterize the Atomic Structures of Surface-Deposited Au309 Clusters
Benjamin C. Curley and Roy L. Johnston, Neil P. Young, Z. Y. Li, Marcel Di Vece, Richard E. Palmer, Andrew L. Bleloch, J. Phys. Chem., 111, 17846 (2007)
Development of magnetic materials for photonic applications
Kasper Baert, Wim Libaers, Branko Kolaric, Renaud A. L. Vallée, Mark Van der Auweraer, Didier Grandjean, Marcel Di Vece, Peter Lievens, Koen Clays, Journal of Nonlinear Optical Physics & Materials, 16, 289 (2007)
Co-deposition of atomic clusters of different size and composition
M. Di Vece, N. Young, Z. Y. Li, Y. Chen and R. E. Palmer, Small, 2, 1270 (2006)
Pinning of size-selected Pd nanoclusters on graphite
S. Gibilisco, M. Di Vece, S. Palomba, G. Faraci and R.E. Palmer, J. Chem Phys., 125, 084704 (2006)
Modelling the pinning of Au and Ni clusters on graphite
R. Smith, C. Nock, S.D. Kenny, J.J. Belbruno, M. Di Vece, S. Palomba, R.E. Palmer, Phys. Rev. B., 73, 125429 (2006)
Pinning of size-selected gold and nickel nanoclusters on graphite
M. Di Vece, S. Palomba, and R.E. Palmer, Phys. Rev. B, 72, 073407 (2005)
Structure of the Mg2Ni switchable mirror: an EXAFS investigation
M. Di Vece, A. M. J. van der Eerden, D. Grandjean, R. J. Westerwaal, W. Lohstroh, S.G. Nikitenko, J. J. Kelly, and D.C. Koningsberger, Mat. Chem. Phys., 91, 1 (2005)
Electrochemical study of hydrogen diffusion in a vanadium thin film
M. Di Vece, A. Remhof and J.J. Kelly, Electrochem. Com., 6, 17 (2004)
Synthesis and characterization of Pd nano-pillar arrays in the metal hydride switchable mirror
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Electrochemical hydrogen intercalation kinetics in gadolinium switchable mirrors
M. Di Vece, I. Swart and J.J. Kelly, J. Appl. Phys.,94, 4659 (2003)
X-ray absorption fine structure study of the structural and electronic properties of the GdMg hydride switchable mirror
M. Di Vece, A.M.J. van der Eerden, J.A. van Bokhoven, S. Lemaux, J.J. Kelly and D.C. Koningsberger, Phys. Rev. B, 67, 035430 (2003)
Electrochemical study of hydrogen diffusion in yttrium hydride switchable mirrors
M. Di Vece and J.J. Kelly, J. Alloy. Comp., 356-357, 156-159 (2003)
Optical switching properties from isotherms of Gd and GdMg hydride mirrors
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Tunable reflectance of Mg–Ni–H films
J. Isidorsson, I.A.M.E. Giebels, R. Griessen and M. Di Vece, Appl. Phys. Lett., 80, 2305 (2002)

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I.A.M.E. Giebels, S. J. van der Molen, R. Griessen, and M. Di Vece, Appl. Phys. Lett., 80, 1343 (2002)
A Photoelectrochemical Study of the GdMg Hydride Switchable Mirror
M. Di Vece, P. van der Sluis, A.-M. Janner and J.J. Kelly, J. Electrochem. Soc. 148, G576-G580 (2001)

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"Elongated nanostructured solar cells with a plasmonic core", Review in Plasmonics, Edited by Chris Geddes, Springer 2015

"Deflection and Mass Filtering", Gas-Phase Synthesis of Nanoparticles, First Edition. Edited by Yves Huttel. Wiley-VCH Verlag GmbH & Co. KGaA. (2017)