# CV of Prof. Gianfranco Pacchioni

Gianfranco Pacchioni is full professor of solid state chemistry. From 2003 till September 2009 he has been Director of the Department of Materials Science at the University of Milano Bicocca.

He studied chemistry at the University of Milano and obtained the Ph. D. in Physical Chemistry at the Freie Universität Berlin, Institut für Physikalische Chemie (Berlin West) (1981-1984) under the supervision of Prof. J. Koutecky. He made a Post-doctoral experience at the IBM Almaden Research Center (CA) under the supervisor Dr. P. S. Bagus.

His research activity is directed towards surface science and material science problems, with particular emphasis on the properties of oxide materials and metal nanoclusters. Prof. Pacchioni has a wide experience in the description of defects in oxides and their spectroscopic properties. From the mid ’90s he has been very active in the study of small metal clusters and nanoparticles supported on oxide surfaces, their chemical activity, diffusion and nucleation processes, catalytic properties. Prof. Pacchioni has a special expertise in the analysis and interpretation of optical, vibrational, and magnetic resonances spectroscopies. In the field of supported metal clusters he has given important contributions for the elucidation of the reactivity of metal nanoclusters on ultra-thin films. About one half of the papers produced in the last years are joined experimental-theoretical studies in this field.

He has published more than 400 papers in refereed journals, and his work has received about 14000 citations (h-index 66). He has given more than 270 lectures in international conferences and research institutions.

Prof. Pacchioni has spent several periods abroad, working in research institutions as visiting fellow or visiting professor: IBM Almaden Research Center, San Jose, California, USA (1988, 1990, 1993); Lehrstuhl für Theoretische Chemie, TU München, Munich, Germany (1993, 1994, 1995); Department de Quimica Fisica, Universitat de Barcelona, Barcelona, Spain (1998, 1999); Institut de Chimie Theorique, University of Paris VI (2002); Department of Chemical Physics, Fritz-Haber Institut der MPI, Berlin (2005), Laboratoire des Matériaux Mésoscopiques et Nanométriques, Universitè Paris VI (2009), University of North Texas (2009), Ecole Nationale Supérieure de Chimie de Paris (2011)

In his career, he has received a number of honors and awards: Alexander von Humboldt fellow (1993); Gold Medal "Raffaello Nasini", Italian Chemical Society (1994); National Price “Federchimica” (1996); Professor Visitant Invitat, University of Barcelona (1998-1999); Humboldt Research Award (2005); Fellow of the European Academy of Sciences (2009). He is or has been member of the Editoria or Advisory boards of Surface Science (2001-2006), Theoretical Chemistry Account (2003-now), ChemCatChem (2009-now), Physical Review Letters (2012-now), ChemPlusChem (2012-now), The Scientific World Journal (2012-now), Journal of Materials (2012-now), and Editor-in-chief of The Open Condensed Matter Physcs Journal (2008-2012).

Prof. Pacchioni has been director/chairman of NATO Advanced Research Workshop (1991), NATO Advanced Study Institutes (1994, 1996, 2000), CECAM Workshops (1991, 1992), Euroconferences (2002). He is presently Chairman of the COST Action D41 “Inorganic oxide surfaces and interfaces” (2006-2009), and has acted as Chairman of the Panel PE5 “Materials and Synthesis” of the European Research Council (2008-2012). He is member of the

Scientific Council of the “Fondazione Tronchetti Provera”, of the Fondazione EnergyLab, and of the Administration Council of the Consortium CORIMAV for Advanced materials between the University of Milano Bicocca and Pirelli.

Professor Pacchioni has also been active in popularizing science. He has published several articles for the italian version of Scientific American. For the Italian Publisher Zanichelli he has authored two books, “Idee per diventare scienziato dei materiali” (2005) and “Quanto è piccolo il mondo – Sorprese e speranze dalle nanotecnologie” (2007) to familiarize young students and normal people with materials science and nanotechnology.

### Selected publications


1) G. Pacchioni, L. Giordano, M. Baistrocchi, “Charging of metal atoms on ultra-thin MgO/Mo(100) films”, ***Physical Review Letters***, 94, 226104-4 (2005).
2) M. Chiesa, E. Giamello, C. Di Valentin, G. Pacchioni, Z. Sojka, S. Van Doorsiaer, “The nature of the chemical bond between metal atoms and oxide surfaces: new evidences from spin density studies of K atoms on alkaline earth oxides”, ***J. of American Chemical Society***, 127, 16935-16944 (2005).
3) M. Sterrer, M. Yulikov, T. Risse, H.-J. Freund, J. Carrasco, F. Illas, C. Di Valentin, L. Giordano, G. Pacchioni, “When the reporter induces the effect: unusual IR spectra of CO on $Au_1$/MgO(100)/Mo(100)”, ***Angewandte Chemie Int. Ed.***, 45, 2633-2635 (2006).
4) M. Yulikov, M. Sterrer, M. Heyde, H.-P. Rust, T. Risse, H. J. Freund, G. Pacchioni, A. Scagnelli, “Binding of single gold atoms on thin MgO(001) films”, ***Physical Review Letters***, 96, 146804-4 (2006).
5) D. Ricci, A. Bongiorno, G. Pacchioni, U. Landman, “Bonding trends and dimensionality crossover of gold nanoclusters on metal-supported MgO thin films”, ***Physical Review Letters***, 97, 036106-4 (2006).
6) C. Di Valentin, G. Pacchioni, A. Selloni, “Electronic structure of defect states in hydroxylated and reduced rutile $TiO_2$ (110) surfaces”, ***Physical Review Letters***, 97, 166803-4 (2006).
7) M. Chiesa, M. C. Paganini, E. Giamello, D. M. Murphy, C. Di Valentin, G. Pacchioni, “Excess electrons stabilized on ionic oxide surfaces”, ***Accounts Chemical Research***, 39, 861-867 (2006).
8) S. Livraghi, M. C. Paganini, E. Giamello, A. Selloni, C. Di Valentin, G. Pacchioni, “Origin of photo-activity of nitrogen-doped titanium-dioxide under visibile light”, ***J. American Chemical Society***, 128, 15666-15671 (2006).
9) M. Sterrer, T. Risse, U. Martinez Pozzoni, L. Giordano, M. Heyde, H.-P. Rust, G. Pacchioni, H.-J. Freund, “Control of the charge state of metal atoms on thin MgO films”, ***Physical Review Letters***, 98, 096107-4 (2007).
10) F. Napoli, M. Chiesa, E. Giamello, E. Finazzi, C. Di Valentin, G. Pacchioni, “Partially hydroxylated polycrystalline ionic oxides: a new route towards electron rich surfaces”, ***J. of American Chemical Society***, 129, 10575-10581 (2007)
11) L. Giordano, P. Sushko, G. Pacchioni, A. Shluger, “Electron trapping at point defects on hydroxylated silica surfaces”, ***Physical Review Letters***, 99, 136801/1-4 (2007).
12) M. Sterrer, T. Risse, L. Giordano, M. Heyde, N. Nilius, H.-P. Rust, G. Pacchioni, H.-J- Freund, “Pd monomers, dimers, and trimers on the MgO(001) surface viewed individually”, ***Angewandte Chemie Int. Ed.***, 46, 8703-8706 (2007).
13) H. J. Freund, G. Pacchioni, “Oxide ultra-thin films on metals: new materials for the design of supported metal catalysts”, ***Chemical Society Reviews***, 37, 2224-2242 (2008).
14) S. Ulrich, N. Nilius, H. J. Freund, U. Martinez, L. Giordano, G. Pacchioni, “Modifying the adsorption characteristics of inert silica films by inserting anchoring sites”, ***Physical Review Letters***, 102, 016102/1-4 (2009).
15) T. König, G. H. Simon, H. P. Rust, G. Pacchioni, M. Heyde, H. J. Freund, “Measuring the charge state of point defects on MgO/Ag(001”, ***J. of American Chemical Society***, 131, 17454-17545 (2009).
16) J.-F- Jerratsch, N. Nilius, D. Topwal, U. Martinez, L. Giordano, G. Pacchioni, H. J. Freund, “Stabilizing monomeric iron species in a porous silica/Mo(112) film”, ***ACS Nano***, 4, 863-868 (2010).

17) T. König, G. H. Simon, U. Martinez, L. Giordano, G. Pacchioni, M. Heyde, H.-J. Freund, "Direct measurement of the attractive interaction forces on $F^0$ color centers on MgO(001) by dynamic force microscopy", ***ACS Nano***, 4, 2510-2514 (2010).
18) Y. N. Sun, L. Giordano, J. Goniakowski, M. Lewandowski, Z. H. Qin, C. Noguera, S. Shaikhutdinov, G. Pacchioni, H. J. Freund, "The interplay between structure and CO oxidation catalysis on metal supported ultrathin oxide films", ***Angewandte Chemie Int. Ed.***, 49, 4418-4421 (2010).
19) A. Gonchar, T. Risse, H.-J. Freund, L. Giordano, C. Di Valentin, G. Pacchioni, "Activation of oxygen on MgO: $O_2^-$ formation on thin, metal supported MgO(001) films", ***Angewandte Chemie Int. Ed.***, 50, 2635-2638 (2011).
20) L. Giordano, G. Pacchioni, "Oxide films at the nanoscale: new structures, new functions, and new materials", ***Accounts of Chemical Research***, 44, 1244-1252 (2011).
21) X. Shao, S. Prada, L. Giordano, G. Pacchioni, N. Nilius, H.-J. Freund, "Tailoring the shape of metal ad-particles by doping the oxide support", ***Angewandte Chemie Int. Ed.***, 50, 11525-11527 (2011).
22) F. Stavale, X. Shao, N. Nilius, H.-J. Freund, S. Prada, L. Giordano, G. Pacchioni, "Donor characteristics of transition metal doped oxides: Cr-doped MgO versus Mo-doped CaO", ***J. of American Chemical Society***, 134, 11380-11383 (2012).
23) G. Pacchioni, "Two-dimensional oxides: multifunctional materials for advanced technologies", ***Chemistry a European Journal***, 18, 10144-10158 (2012).
24) C. Di Valentin, M. Rosa, G. Pacchioni, "Radical versus nucleophilic mechanism of formaldehyde polymerization catalyzed by $(WO_3)_3$ clusters on reduced or stoichiometric $TiO_2$(110)", ***J. of American Chemical Society***, 134, 14086-14098 (2012).