



Seminar



Digital olfaction

By

Professor Gianarelio Cuniberti

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Time: 10:00am

Venue: Room 1118, William M.W. Mong Engineering Building, CUHK

Abstract

Olfaction is an ancient sensory system that allows us to access sophisticated information about our environment. Drawing inspiration from biology, carbon nanomaterials-based gas sensors combined with machine learning algorithms aim at replicating this performance and digitizing the sense of smell. This lecture presents is about gas discrimination and identification performance of carbon nanomaterials-based nanosensors. Functionalized carbon nanomaterials-based nanosensors were fabricated on multiple-channel gas sensor devices, and the sensing signal was acquired when exposed to various gases. The transient features of the gases were then extracted from the sensing signal and fed to a machine-learning algorithm to discriminate and identify the gases. The developed carbon nanomaterials-based electronic olfaction system shows excellent gas identification performance for different gases. This platform can be used to miniaturize e-noses, digitize odors, and distinguish various gases and volatile organic compounds (VOCs) for applications such as pathogen detection, environmental monitoring, and disease diagnosis.

Biography

Professor Gianarelio Cuniberti holds since 2007 the Chair of Materials Science and Nanotechnology at the Technische Universität Dresden (TU Dresden) and the Max Bergmann Center of Biomaterials in Dresden, Germany. He is a member of the TU Dresden School of Engineering Sciences (Materials Science) and of the School Science (Physics). He studied Physics at the University of Genoa, Italy (where he got his B.Sc. and M.Sc.) and obtained his Ph.D. in 1997 at the age of 27 in a joint collaboration between the University of Genoa and the University of Hamburg, Germany. He was visiting scientist at MIT and the Max Planck Institute for the Physics of Complex Systems Dresden. From 2003 to 2007, he was the head of a Volkswagen Foundation Research Group at the University of Regensburg, Germany. His research activity is internationally recognized in more than 400 scientific journal papers to date. He initiated and organized numerous workshops, schools, and conferences and took part in international research training networks, offering extensive opportunities for young scientists. He has given plenary and invited talks at numerous international meetings. He serves as a referee for numerous high-impact journals, and for several funding research institutions including among others the EU, the German Science Foundation (DFG), the USA National Science Foundation (NSF), the German Israeli Foundation (GIF), and the Alexander von Humboldt Foundation. He received several talent scholarships and awards including the Max Planck Society Schloebmann award (2001) and the VolkswagenStiftung Research Group Individual Grant (2003). He is a member of several scientific organizations and a corresponding member of the Umbrian Academy of Sciences. Gianarelio Cuniberti is an Honorary Professor at the Division of IT Convergence Engineering of POSTECH, the Pohang University of Science and Technology since 2009, since 2011 Adjunct Professor for the Department of Chemistry at the University of Alabama, and since 2019 Guest Professor at SJTU. In 2018 he became a faculty member of the transcampus between TU Dresden and King's College London. Professor Gianarelio Cuniberti is an elected member of the European Academy of Sciences, of the Academia Europaea and of the Germany National Academy of Science and Engineering (acatech).