

Manfred M. Kappes



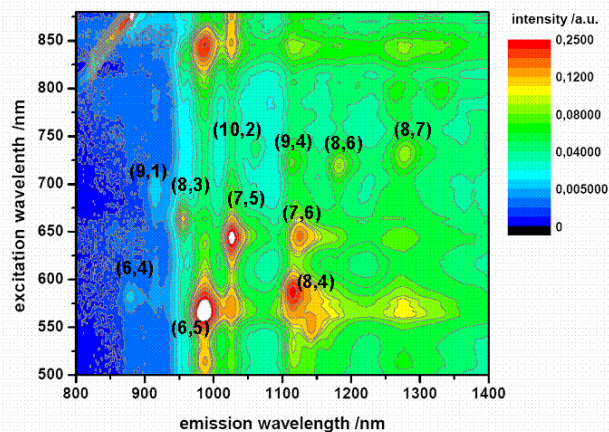
Full Professor. Physical Chemistry of Microscopic Systems. Born 1957; B.Sc. 1977, Concordia University, Montreal, Canada; Ph.D. 1981, Massachusetts Institute of Technology, Cambridge, USA; Postdoctoral Fellow 1981-87, Universität Bern, Switzerland; Habilitation 1987, Bern; Assistant and Associate Professor 1987-1991, Northwestern University, Evanston, USA. Voice: (0049)721-608-2094; FAX: (0049)721-608-7232; manfred.kappes@chemie.uni-karlsruhe.de, <http://www.ipc.uni-karlsruhe.de/mik/>

Principal Research Interests

Research in my group, which is located both at the University and in the Institute of Nanotechnology – FZK, is focused on the novel properties of matter constrained to nanometer dimensions. Our activities can presently be divided into six main areas:

- UV/Vis spectroscopy of isolated metal clusters and their derivatives in collisionless molecular beams. We focus on the study of the geometric structure and chemical bonding. Our general interest is the behaviour of delocalized electrons confined to a microscopic scale.
- Generation, purification and characterization of single-walled carbon nanotubes. We are presently interested in individual tube optical properties, dielectrophoretic deposition, (n,m) specific separation strategies, and novel nanotube based composite materials.
- Molecular ion beam soft-landing. An appropriate UHV apparatus allows generation and surface spectroscopic characterization of cluster materials deriving from deposition of size-selected units.
- Multianions. Multiply negatively charged ions can manifest previously uncharted phenomena such as tunnelling autodetachment. We study physical properties using a variety of gas-phase methods such as photoelectron and photo-dissociation spectroscopy.
- Trapped molecular ions. We use Paul and Penning Trap methods to probe isolated ions over long time scales. In one approach we study cluster structure and structural changes by electron-diffraction. In another we probe the fluorescence emission of isolated nano-particles.

- Nanostructuring of single crystal surfaces via focused ion beam irradiation and oxidative etching. A present activity is structuring of nanopits and trenches into HOPG towards modifying electronic properties.



Fluorescence contour map for semi-conducting single-walled carbon nanotubes

Selected Publications

- "Matrix-imposed Stress-induced Shifts in the Photoluminescence of Single-walled Carbon Nanotubes at Low Temperatures", Katharina Arnold, Sergei Lebedkin, Oliver Kiowski, Frank Henrich, and Manfred M. Kappes, *Nano Letters*, 2004, 4, 2349-2354
- "Binding Energies of CO on Gold Cluster Cations Au_n^+ (n=1-65): A Radiative Association Kinetics Study", Marco Neumaier, Florian Weigend, Oliver Hampe and Manfred Kappes, *J. Chem. Phys.*, 2005, 122, 104702-1 -104702-11
- "The structures of Ag_{55}^+ and Ag_{55}^- : Trapped Ion electron Diffraction and Density Functional Theory", Detlef Schooss, Martine N. Blom, Joel H. Parks, Bernd von Issendorff, Hellmut Haberland and Manfred M. Kappes, *Nano Lett.*, 2005, 5, 1972 -1977
- " C_n Films (n=50, 52, 54, 56 and 58) on Graphite: Cage Size Dependent Electronic Properties ", Daniel Löffler, Stefan S. Jester, Patrick Weis, Artur Böttcher and Manfred M. Kappes, *J. Chem. Phys.*, 2006, 124, 054705.
- "Femtosecond Pump-probe Photoelectron Spectroscopy of Isolated C_{60} Negative Ions", Oli T. Ehrler, Ji-Ping Yang, Christof Hättig, Andreas-N. Unterreiner, Horst Hippler, and Manfred M. Kappes, *J. Chem. Phys.*, 2006, 125, 074312.
- "Nanostructuring the graphite basal plane by focused-ion-beam patterning and oxygen etching", Artur Böttcher, M. Heil, Ninette Stürzl, Stefan S. Jester, Sharali Malik, F. Perez-Willard, P. Brenner, Dagmar Gerthsen, Manfred M. Kappes, *Nanotechnology*, 2006, 17, 5889.