Experimental probes for investigating the nano-bio interface without external labels are underdeveloped, yet they would meet a key need not just for understanding interfacial processes important in environmental nanoscience but also in areas such as materials science and biology. Here, the few direct probes ranging from synchrotron to nonlinear optical approaches that currently exist for this task are reviewed, and directions for future developments are given. It is pointed out that there is no ‘silver bullet’ for this problem, which is demonstrated with one specific example investigating how 4-nm sized gold metal nanoparticles having various charged ligands interact with positively and negatively charged supported lipid bilayers.

Franz M. Geiger. Professor of Chemistry. Vordiplom 1994 Technische Universitaet Berlin; 1996-1998 NASA Predoctoral Fellow in Earth System Sciences; Ph.D. 1998 Georgetown University; 1999-2001 NOAA Postdoctoral Fellow in Climate and Global Change with Mario Molina at MIT; 2001-2006 Assistant Professor; 2006-2011 Associate Professor; 2011-present Professor, Department of Chemistry, Northwestern University; 2006-2012 Associate Department Chair; Editorial Advisory Board Member for The Journal of Physical Chemistry, Chemical Physics Letters, Surface Science, and Geochemical Transactions; Board Member of the Telluride Science Research Center; 2004 Camille and Henry Dreyfus Foundation Postdoctoral Research Fellowship Award; 2004 NSF-CAREER Award; 2006-2008 Dow Chemical Company Professor; 2007 Fellow, Alfred P. Sloan Foundation; 2010-2012 Irving M. Klotz Professorship; 2012 Baker Lecturer Cornell University; 2012 Fellow, American Association for the Advancement of Science.