Bio: Arrigo Calzolari graduated in Physics in 2003 at University of Modena and Reggio Emilia (Italy) and is researcher at the CNR-NANO Institute since 2010. He is also adjunct professor at Physics Department of the University of North Texas (Denton TX, USA) since 2012 and Member of Aflowlib Consortium for material genomics (Duraham NC, USA) since 2015. AC's research activity is focused on the ab initio study, based on DFT and beyond, of the optoelectronic, plasmonic, vibrational and transport properties of materials, nanostructures, molecules, and interfaces, for energy conversion ad nanoelectronics. The research activity includes also the development of original methods for the characterization of the optical and transport properties of advanced materials.

Arrigo Calzolari Seminar

Thursday, May 11th, 2017

10:30am , BRK 1001

Alternative Materials for Plasmonics in the Near-IR and Visible Range

Abstract: Using first principles calculations, we characterize the optoelectronic and plasmonic properties of two classes of materials, proposed as alternative to standard noble metals for plasmonic applications. We first investigate the origin of near-infrared plasmonic activity in M-doped ZnO (MZO), one of the most promising TCO materials for optoelectronics and photovoltaics applications. Our results predict realistic values for the plasma frequency and the free electron density as a function of the M-doping and structural defects, in agreement with recent experimental results. Then we study the plasmonic properties of refractory metal nitrides: we investigate the plasmon dispersion relations of TiN bulk and we predict the effect of pressure on its optoelectronic properties. Finally, we address the formation and stability of surface- plasmon polaritons at different TiN/dielectric interfaces proposed by recent experiments.