



ZAKARIA ABD EL-FATTAH 'Tuning the Surface Band Structure in 1D and 2D Self-Assembled Metallic Superlattices'

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Seminar, September 10, 2014, 15:00. Seminar Room

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The two-dimensional, free-electron-like band structure of noble metal surfaces can be radically transformed by appropriate nanostructuration. A case example is the 2D triangular dislocation network that characterizes the epitaxial Ag/Cu(111) system, which exhibits a highly featured band topology with a full band gap above E_F and a hole-pocket-like Fermi surface. We will show that controlled doping of the Ag/Cu(111) interface with Au allows one to observe a complete Lifshitz transition at 300 K; i.e., the holepockets fill up, the band gap entirely shifts

across EF, and the Fermi surface becomes electron-pocket-like. Likewise, surfaces with periodic array of 1D steps, namely vicinal surfaces, exhibit Fermi gap openings when the periodicity is tuned to the substrate's Fermi wavevector. We will show that at such distinct periodicities there exists geometrical/electronic structure interplay. At the end we combine both the 2D dislocation lattice with the 1D step array on the Ag/v-Cu(111). We obtained highly featured surface states with coexisting dislocation and step gaps. Such nanopatterned surfaces are good candidates to explore new plasmonic-like phenomena within the context of "surface state nanoelectronics".

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Hosted by Prof. Javier Garcia de Abajo