Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Electronic confinement imposed by a nanoporous network: Band formation from coupled quantum dots KATHRIN MUELLER, MEIKE STOEHR, University of Groningen, The Netherlands, MANFRED MATENA, University of Basel, Switzerland, JORGE LOBO-CHECA, Centre d'Investigacio en Nanociencia i Nanotecnologia, Spain, THOMAS JUNG, Paul-Scherrer-Institut, Switzerland, LUTZ GADE, University of Heidelberg, Germany — The electronic and optical properties of crystalline solids exhibit characteristics that derive to a large extent from the periodic arrangement and interactions of their component quantum systems, such as atoms or molecules. Quantum effects due to confinement of electronic states have been extensively studied for surface states of noble metals which are characterized by a quasi 2D electron gas. The design of such periodic 2D structures on surfaces is more readily achieved using molecular self-assembly from building blocks instead of atom by atom manipulation. We chose a perylene derivative (DPDI) as organic building block which is known to form a highly ordered porous network on Cu(111) upon thermal dehydrogenation. To study the interaction between the electronic surface state and our porous network structure, scanning tunneling spectroscopy (STS) and angle-resolved photoemission (ARPES) was used. Each pore of our porous network confines the surface state of the Cu substrate what can be described as a 0D quantum dot. This work can lead to artifically created electronic structures by modification of the dimensions of the molecular network periodicities together with the appropriate choice of the substrate and the building block.

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Date submitted: 01 Nov 2011 Electronic form version 1.4