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Modification of ferromagnetism in semiconductors by molecular monolayers ITAI CARMELI, FRANCISCO BLOOM, CHEYNE SCOBY, ELISABETH GWINN, California Nanosystems Institute, UCSB, TED KREUTZ, Physics Department, Pennsylvania State University, RON NAAMAN, Chemical Physics Dept., Weizmann Institute, ART GOSSARD, Materials and ECE Departments, UCSB — We report that adsorption of monolayers of organic molecules onto ferromagnetic semiconductor heterostructures can produce large changes in magnetic properties [1]. The digital-alloy heterostructures studied have 1/2 monolayer MnAs planes embedded in GaAs. We investigate effects on magnetic properties of self- assembly of various organic molecules onto the heterostructure surface. Depending on the molecular structure, the monolayers can either strengthen or suppress ferromagnetism. We attribute this chemical modulation of magnetic properties to electronic changes brought about by molecular binding to the semiconductor surface.

[1] T.C. Kreutz, R. Artzi, E.G. Gwinn, R. Naaman, H. Pizem, C.N. Sukenik and A.C. Gossard, Applied Physics Letters 83, 4211(2003).

Elisabeth Gwinn
Physics Dept. UCSB

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