

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Sorting Category: 10.1.1 (E)

Existence of Ferromagnetism in Stacked Bilayers of Pd/C₆₀¹ SIDDHARTHA GHOSH, SEFAATTIN TONGAY, ARTHUR F. HEBARD, Department of Physics, University of Florida, Gainesville, FL 32611 USA, HASAN SAHIN, SALIM CIRACI, UNAM-Institute of Materials Science and Nanotechnology, Bilkent University, 06800 Ankara, Turkey — We report on an experimental and theoretical study of the magnetic properties of multilayer structures fabricated by alternating layers of sputter-deposited Pd and thermally-sublimated C₆₀. Auger Electron Spectroscopy and SEM techniques have been used to characterize samples for which magnetic measurements in a commercially available SQUID have been made. The magnetization measurement reveals ferromagnetism in the Pd/C₆₀ system, which has Curie temperature $T_C \sim 450\text{K}$, modified Bloch coefficient $P \sim 2.7$ and a temperature-independent coercive field of 50 Oe. The observed ferromagnetism is surprising since both C₆₀ and Pd are non-ferromagnetic in the non-interacting limit. Density functional theory (DFT) calculations show that while the C₆₀ molecules are nonmagnetic unless polymerized, Pd films have a degenerate ground state that can become ferromagnetic with a weak perturbation. Though the calculated charge transfers of ~ 0.06 e between C₆₀ and Pd are not the cause of ferromagnetism, DFT shows that ferromagnetism can be associated with Pd clusters or an interaction of C₆₀ molecules with sharp edges of the Pd thin film.

¹This work is supported by the National Science Foundation (NSF) under Contract Number 1005301 (AFH) and by TUBITAK through Grant No:108T234 (SC).

Prefer Oral Session

Prefer Poster Session

Siddhartha Ghosh
ghoshsi@phys.ufl.edu

Department of Physics, University of Florida, Gainesville, FL 32611 USA

Date submitted: 19 Jan 2012

Electronic form version 1.4