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Effect of confinement on spin polarization and magnetism of Co_2Si nanoclusters[1] DAVID SELLMYER, BALAMURUGAN BALASUBRAMANIAN, PRIYANKA MANCHANDA, RALPH SKOMSKI, PINAKI MUKHERJEE, BHASKAR DAS, NCMN, University of Nebraska, Lincoln, NE 68588, GEORGE HADJIPANAYIS, University of Delaware, Newark, DE 19716 — Size-modified electronic structure and surface effects can lead to unusual magnetic ordering, modified ordering temperatures, and different spin structures in nanoclusters as compared to the corresponding bulk alloys. Thus nanoclusters can be used as building blocks to create new complex magnetic nanostructures for potential applications.[2] We show room-temperature ferromagnetic ordering in Co_2Si nanoclusters with relatively large magnetic moments (0.49 μ_B/Co at 300 K and 0.70 μ_B/Co at 10 K) and magnetocrystalline anisotropy ($K_1 \approx 4$ Mergs/cm^3 at 10 K), as contrasted to very weak itinerant magnetism in bulk Co_2Si (0.001 μ_B/Co at 300 K and 0.072 μ_B/Co at 10 K). The DFT and analytical model calculations explain the size-dependence of the observed magnetic moments on the size of Co_2Si nanoclusters, which vary from 0.6 to 30 nm, by a surface-induced spin polarization of nanoclusters.

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[2]B. Balamurugan, D.J. Sellmyer et al. *Sci. Rep.* **4**, 6265 (2014); *Adv. Mater.* **25**, 6089, (2013); *Appl. Phys. Lett.* **101**, 122407 (2012).

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