Magnetic behavior of clusters of ferromagnetic transition metals

The effective magnetic moments of small iron and cobalt clusters have been calculated by assuming that the clusters undergo superparamagnetic relaxation. The effective moments per atom are found to be much below the bulk values, even at low temperatures (100 K). They increase with particle size and the applied magnetic field, and are in good agreement with recent beam experiments on FeN and CoN clusters. We also provide the first realistic estimates of the true magnetic moments in small CoN clusters. The present studies cast doubt on the recent theoretical interpretation of the observed reduced magnetic moments in small clusters compared to bulk as being due to melting of surface spins.

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