

Magnetism in oxide nanoparticles: Surface effects.

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It has been recently reported that some non-magnetic materials in bulk state exhibit magnetic behavior at the nanoscale (nanoparticles and thin films) due to surface and size effects. Most of the results have been observed in oxides. Some of these effects are not reproducible and seem related to experimental difficulties when measuring very small signals inherent to the nano scale [1]. Common handling and measurement procedures may induce spurious signals that are not important when dealing with traditional macroscopic bulk magnetic materials.

On the other hand some results are reproducible and have been reproduced by different groups. Some of these reliable observations can be explained with the well established theories of magnetism applied to surfaces and interfaces [2-5]. In particular oxides containing magnetic ions (as Mn, Co, Fe) with paramagnetic and antiferromagnetic interactions may exhibit ferromagnetic-like behavior due to surface modifications induced by the local order modifications due to the presence of other materials.

Finally, there are some results that can not be explained within the current framework of magnetism and suggest the existence of new magnetic ordering mechanisms at the nanoscale [6].

References

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