

Remanent magnetization, magnetic coupling, and interface ionic configurations of intergrown rhombohedral and cubic Fe-Ti oxides: A short survey

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ABSTRACT



Some intergrowths between rhombohedral and cubic Fe-Ti oxides show properties of high remanence and stability, greater than can be explained solely by properties of the individual phases. Magnetic experiments demonstrate magnetic coupling across the interfaces between these phases. These have similarities to intergrowths solely of rhombohedral oxides with the properties of lamellar magnetism. Long-known studies indicate the common interface is along (111) octahedral planes of the cubic phase and (001) of the rhombohedral phase. This is confirmed in

new TEM results on a synthetic titano-hematite and on a natural ferri-ilmenite, both with reduction-exsolution lamellae of magnetite, where high-resolution lattice-fringe images demonstrate a common orientation of Fe octahedra along the interface. Such information provides a starting point to investigate atomic configurations, ionic charge imbalance, and magnetic moments along these interfaces, and leads toward a new application of the theory of lamellar magnetism.

Keywords: Magnetic coupling, rhombohedral, cubic, oxides, remanent magnetization, interface, Invited Centennial article