Oriented attachment and exchange coupling of α-Fe₂O₃ nanoparticles - DTU Orbit
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We show that antiferromagnetic nanoparticles of alpha-Fe₂O₃ (hematite) under wet conditions can attach into chains along a common [001] axis. Electron microscopy shows that such chains typically consist of two to five particles. X-ray and neutron diffraction studies show that both structural and magnetic correlations exist across the interfaces along the [001] direction. This gives direct evidence for exchange coupling between particles. Exchange coupling between nanoparticles can suppress superparamagnetic relaxation and it may play a role for attachment along preferred directions. The relations between exchange coupling, magnetic properties, and oriented attachment are discussed.