The polyol synthesis of antiferromagnetic CoO nanoparticles: how to tune aggregation and – thus – magnetic properties

Mirjana BARICIC - *Université de Paris Cité, France*

Cobalt oxide cubic phase is an antiferromagnetic material, widely studied in the form of nanoparticles (NPs) for several applications (gas sensors, catalysis, lithium-ion batteries …), and offers an interesting case of study in terms of basic science magnetic properties. Although many synthesis methods have already been developed, colloidal chemistry remains the best way to finely tune the morphological features of a NPs system, and thus its magnetic properties; organic solvents and surfactants can heavily influence the synthesis dynamics, and basing on their chemical properties (polarity, viscosity, steric hindrance etc.), it is possible to drive the growth process towards interesting phenomena, such as oriented aggregations phenomena to form mesocrystals.

Despite this, CoO synthesis is quite delicate: the CoO phase is likely to reduce or oxidate into Co or Co_3O_4 respectively, and other difficult to detect parasitic phases with intense magnetic properties are likely to form, thus making it difficult to obtain a pure system in which magnetic properties can be easily interpreted. Herein, the polyol synthesis method is modified to obtain different morphologies and tuning the size of CoO NPs mesocrystals, also studying the morphology effect on the magnetic properties. Further, synthesis conditions are tuned to obtain a clean and easily interpretable magnetic system.