

# Temperature dependence of the cation distribution in cobalt ferrite spinels

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The experiment run has been highly successful and XAS data has been acquired for the following samples:

- Reference samples: metallic Fe (Fe), metallic Co (Co)
- Single element compounds: CoO (Co K-edge), Co<sub>3</sub>O<sub>4</sub> (Co K-edge) at two temperatures, Fe<sub>3</sub>O<sub>4</sub> (Fe-K edge at two temperatures)
- Cobalt ferrite bulk materials (CoFe<sub>2</sub>O<sub>4</sub>): two samples grown by sol-gel, and one supplied by a commercial company. In each case, XANES and EXAFS spectra have been measured at both the Fe- and Co-K edges, and three temperatures (100K, 300K, 460K), and both in transmission and in fluorescence mode.
- Cobalt ferrite ~100 nm thick thin films (CoFe<sub>2</sub>O<sub>4</sub>) on SrTiO<sub>3</sub>, growth by two different methods: pulsed laser deposition (PLD) and dual-ion beam assisted sputtering (DIBS). In each case, XANES and EXAFS spectra have been measured at both the Fe- and Co K-edges, and three temperatures (100K, 300K, 460K) in fluorescence mode.

The data is being analyzed, but it has already helped ruled out the two explanations originally proposed to explain the evolution of the Mössbauer spectra measured on cobalt ferrite vs. temperature. Work is in progress to determine the detailed inversion level of the films and the bulk materials with temperature. The Co-oxides spectra have already been fitted.

We expect to publish soon the Co-oxides spectra as part of a multitechnique study. The cobalt ferrite data will be published separately and work in their manuscript will start as soon as the fits are completed and a complete discussion of the cation distribution can be performed.

As one of the representative examples, we show below the radial distribution function obtained from the cobalt ferrite data acquired on one of the bulk materials.

