Controlled Cobalt Doping in Biogenic Magnetite Nanoparticles

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The data contained within this dataset is arranged according to the measurement technique used to collect each file. Details of the files are outlined below.

**SLP (Specific loss power)**

4 datasets labeled “CoX\_87kHz” where X = %Co, containing four columns corresponding to:

*Time(s)*

*Temperature (°C)*

*Temperature increase (°C)*

*Temperature increase (°C/g Fe)* – Calculated as a function of the mass of iron in the sample

**Moessbauer**

12 files labeled “CoX\_Y”, where X = %Co and Y = LT or RT (Low temperature or room temperature). Each file contains columns corresponding to:

*v (mm/s)* – Velocity

*Data* – Raw data collected using Moessbauer

*Icalc* – Calculated fit of the data, i.e. sum of the individual component fits

*Sextets or Doublets* – Individual component fits

**SQUID (Superconducting Quantum Interface Device)**

18 files labeled “CoX\_Hys5K” – hysteresis loops collected at 5K, “CoX\_Hys300K” – hysteresis loops collected at 300K and, “CoX\_ZFC\_FC\_REM\_100G” – zero field cooled (ZFC), field cooled (FC) and remanence (REM) collected under a field of 100 Gauss. X = %Co. All data files are arranged in the columns:

*Field (Oe)* – Magnitude of the applied magnetic field in Oersteds

*Temperature (K)* – Temperature of measurement

*Long Moment (emu)* – Magnetic moment measured by the SQUID

*M(emu/g)* – Calculated magnetization as a function of the long moment per gram of sample

**XMCD (x-ray magnetic circular dichroism)**

17 files labeled “CoX\_FeEdge” – XAS (x-ray absorption) collected on the iron *L* edge, “CoX\_CoEdge” – XAS collected at the cobalt *L* edge, “CoX\_FeEdge\_Fit” – calculated fit of the iron edge XMCD. X = %Co.

XAS data arranged in columns:

*eV* – Beamline energy

*XAS+* - XAS collected under positive magnetic field (+0.6T)

*XAS-* - XAS collected under negative magnetic field (-0.6T)

*XMCD* – Difference between XAS+ and XAS-

*Lin.XAS* – Average of XAS+ and XAS-

*Lin.XAS-Step* – Redundant column

*Integ.XAS* – Redundant column

*Integ.XMCD* – redundant column

XMCD data arranged in columns:

*eV* – Beamline energy

*Raw data* – Obtained from difference between XAS+ and XAS-

*Component data (Fe2+[B])* – Fit of Fe2+ octahedral site

*Component data (Fe3+(A))* – Fit of Fe3+ tetrahedral site

*Component data (Fe3+[B])* – Fit of Fe3+ octahedral site

*Fit* – Sum of the three component fits

**XRD (X-ray diffraction)**

1 File containing all X-ray diffraction patterns. Arranged in columns:

*CoX* – Angle (2theta), X = %Co

*Intensity (Arb. Units)* – Intensity of the recorded signal