Electronic Supporting Information (ESI)

Optimization of magnetic properties in fast consolidated SrFe$_{12}$O$_{19}$ nanocrystallites

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Powder X ray diffraction data after SPS

![Graph showing PXRD patterns](image)

**Fig. 1** PXRD patterns obtained on crushed SPS pellets. After sintering the traces of Sr(NO$_3$)$_2$ and NaNO$_3$ are not detected anymore. The bottom pattern represents the results of the powder with the [Sr:Fe]=[1:4] molar ratio, prior SPS.
The effect of pre-alignment in magnetic field prior SPS

Fig. 2 Oriented volume fractions of pre-compacted SFO powder in 0T, 0.15T, 0.45T and 0.55T and SPS consolidated.

The effect of pre-alignment in 0.55T and sintering for 2 and 5 minutes

Fig. 3 (a) The (001) X-ray pole figures of SPS pellets pre-aligned in 0.55 T and sintered for 2 (H-0.55T_t2min) and 5 minutes (H-0.55T) (b) The corresponding oriented volume fractions.
Fig. 4 High resolution transmission electron micrograph collected with a FEI TALOS F200A analytical electron microscope equipped with an X-FEG electron source and a Ceta 16M camera. The image shows a zoom on a hexagonal platelet. The yellow area is fast Fourier transformed (FFT) in the upper right insert. The lower right outlines in purple shows a four times magnification allowing to see the atomic resolution. The TEM image testifies to the single crystal nature of the hexagonal platelets.