# Supporting information

# Terahertz Faraday rotation of $SrFe_{12}O_{19}$ hexaferrites enhanced by Nb-doping

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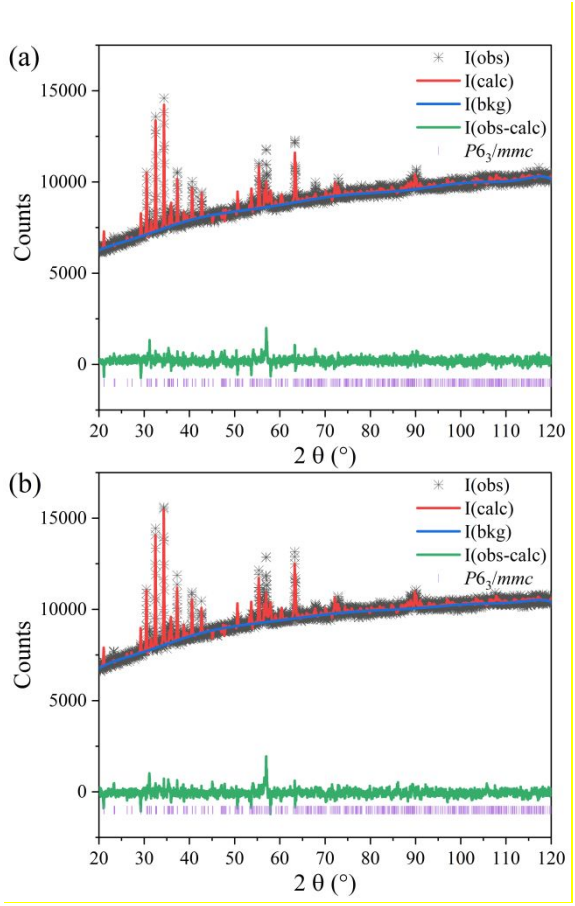


**Figure S1.** X-ray Rietveld fitted spectra for the SFO (a) and SFN3O (b) at room temperature. Fitted and difference data are plotted in red and green curves, respectively. Vertical lines are Bragg's positions for the hexagonal phase with $P6_3/mmc$ space group.

**Table S1.** The crystal and refinement parameters for the M-type hexaferrites.

| Sample | $SrFe_{12}O_{19}$ | $SrFe_{11.97}Nb_{0.03}O_{19}$ |
|---|---|---|
| Crystal system | Hexagonal | Hexagonal |
| (Space group) | $P6_3/mmc$ | $P6_3/mmc$ |
| Lattice parameters (Å) | $a$ = 5.8884(6)<br>$c$ = 23.0742(3) | $a$ = 5.8870(2)<br>$c$ = 23.0647(4) |
| Volume (Å$^3$) | 692.887(2) | 692.262(3) |
| $R$ – factors | $R_{wp}$ = 0.0146<br>$R_p$ = 0.0105<br>$R_{exp}$ = 0.009 | $R_{wp}$ = 0.0143<br>$R_p$ = 0.0101<br>$R_{exp}$= 0.009 |
| $\chi^2$ | 2.665 | 2.682 |
| No. of profile points | 3649 | 3649 |

**Table S2.** The fitting results of O 1s XPS spectra for the M-type hexaferrites.

| Composition | | $O_{latt}$ | $O_{vac}$ | $O_{abs}$ | $O_{vac}$:$O_{latt}$ |
|---|---|---|---|---|---|
| SFO | B.E. (eV) | 529.40 | 530.82 | 532.78 | 0.354(3) |
| | Area (%) | 71.80 | 25.44 | 2.76 | |
| SFN3O | B.E. (eV) | 529.56 | 530.86 | 532.99 | 0.222(1) |
| | Area (%) | 79.67 | 17.70 | 2.63 | |

Note: B.E. is binding energy.

**Table S3.** The fitting results of Fe 2p XPS spectra for the M-type hexaferrites.

| Composition | | $Fe^{2+}$ $2p_{3/2}$ | $Fe^{3+}$ $2p_{3/2}$ | $Fe^{2+}$ $2p_{1/2}$ | $Fe^{3+}$ $2p_{1/2}$ |
|---|---|---|---|---|---|
| SFO | B.E. (eV) | 709.18 | 710.88 | 720.18 | 723.48 |
| | Area (%) | 51.85 | 48.15 | 38.46 | 61.54 |
| SFN3O | B.E. (eV) | 709.38 | 711.08 | 720.38 | 723.78 |
| | Area (%) | 37.20 | 62.80 | 36.10 | 63.90 |

Note: B.E. is binding energy.

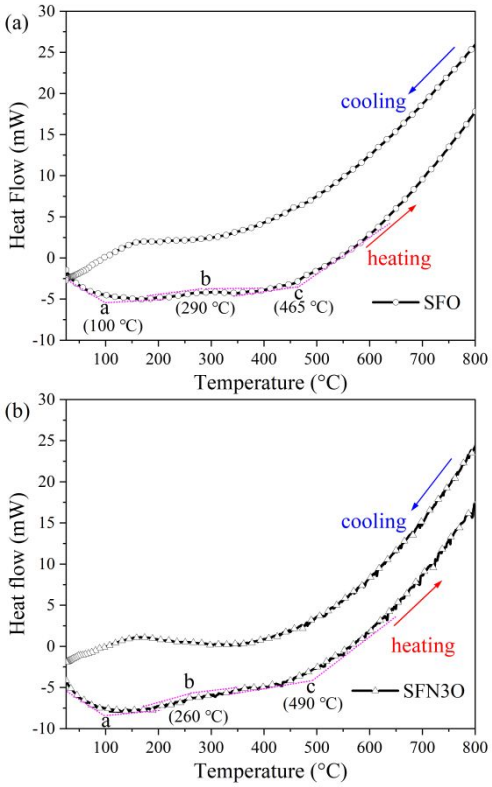


**Figure S2.** DSC thermograms (in heating and cooling regimes) for SFO (a) and SFN3O (b), respectively.