

The cation distributions of Zn-doped normal spinel MgFe_2O_4 ferrite and its magnetic properties

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1. Analysis of the whole morphology of the MFO and MZFO single-particle-chain nanofibers.

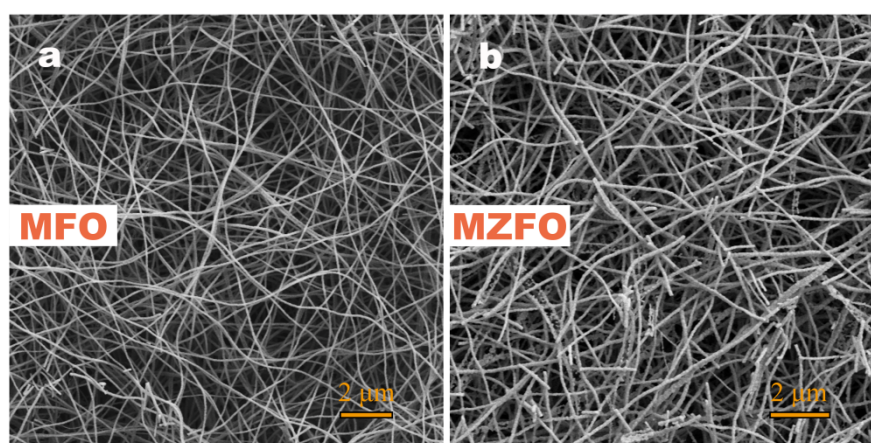
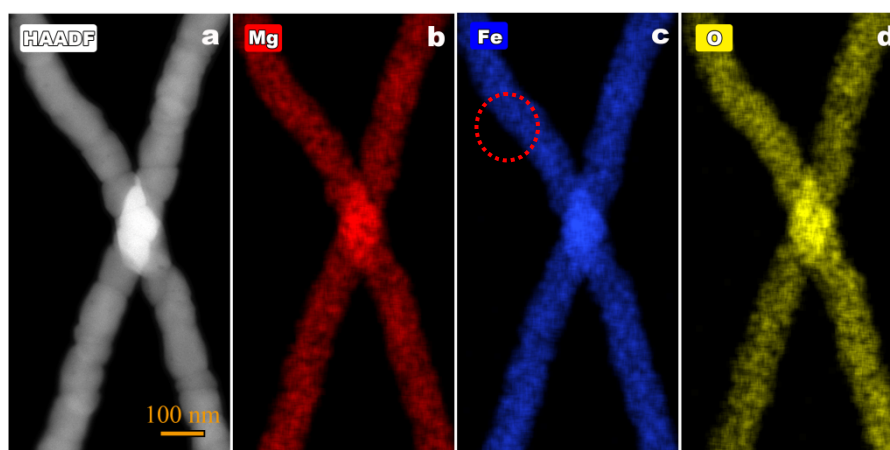


Figure S1. Morphological characterization of the MFO and MZFO single-particle-chain nanofibers. (a–b) Low-magnification SEM images showing the whole morphology of the MFO and MZFO nanofibers.

2. The morphology and chemical composition of the normal spinel structure of MFO single-particle-chain nanofibres.



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Figure S2. Morphological characterization of the normal spinel structure of MFO single-particle-chain nanofibers. (a) HAADF-STEM image of a single MFO single-particle-chain nanofiber. The particle circled in red was selected to take atomic images. (b–d) EDX elemental mappings of magnesium, iron and oxygen, respectively.

HADDF-STEM analysis proves that individual MFO nanofibre is composed of single particle stacked along the nanofibre axis in Fig. S2a. Fig. S2b–d show that representative elemental mappings of magnesium, iron and oxygen, respectively. The Mg, Fe and O elements are evenly distributed throughout the nanofiber, showing a uniform chemical phase.

3. The morphology and chemical composition of the normal spinel structure of MZFO single-particle-chain nanofibers.

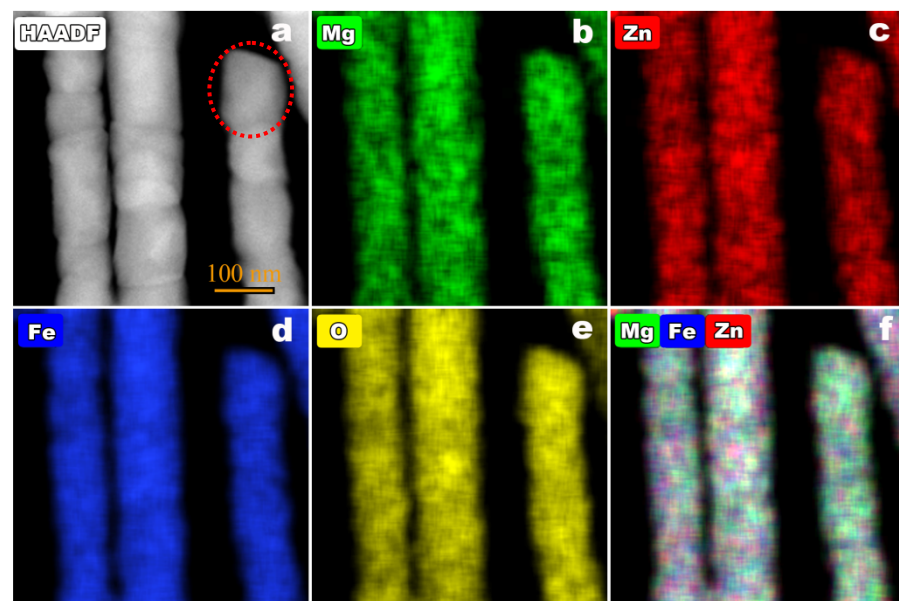


Figure S3. Morphological characterization of the normal spinel structure of MZFO single-particle-chain nanofibers. (a) HAADF-STEM image of a single MZFO single-particle-chain nanofiber. The particle circled in red was selected to take atomic images. (b–e) EDX elemental mappings of magnesium, zinc, iron and oxygen. (f) Mixed mapping image with Mg, Zn and Fe elements.

Fig. S3a shows a HADDF-STEM image of the MZFO single-particle-chain nanofibers. Fig. S3b–e display the corresponding EDX mappings of magnesium, zinc, iron and oxygen elements, respectively. It is seen that doping element Zn is uniformly distributed throughout the MFO nanofibers composed of a uniform chemical phase.

4. Chemical analysis of the normal spinel structure of MFO & MZFO nanofibers.

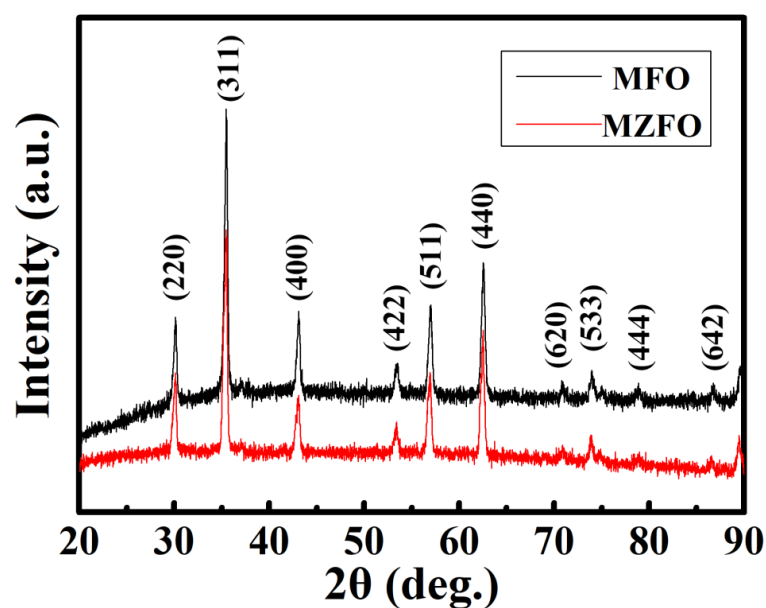


Figure S4. XRD spectrum of the MgFe₂O₄ and Mg_{0.8}Zn_{0.2}Fe₂O₄ nanofibers. Their peaks can be indexed to (220), (311), (400), (422), (511), (440), (620), (533), (444) and (642) planes, indicating a cubic spinel structure.

Fig. S4 shows two typical XRD spectra of a mass of the MFO and MZFO single-particle-chain nanofibers, which indicate that the Zn elements have been successfully doped into the MFO nanofibers, forming a single phase MZFO without no impurity phase.