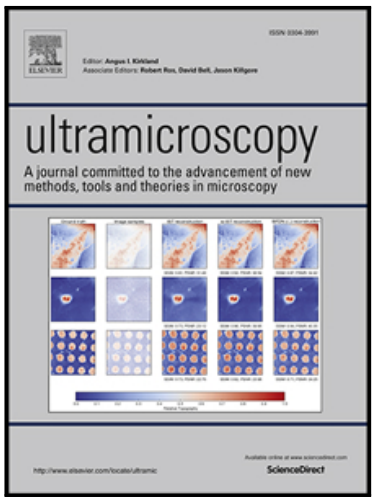

Effect of cation ratio and order on magnetic circular dichroism in the double perovskite $Sr_2Fe_{1+x}Re_{1-x}O_6$

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Highlights:

- Local measurements of magnetic circular dichroism, atomic arrangement, cation order, chemical state and elemental distribution from the very same region provide an improved understanding of structure-property relationships at the nm scale in double perovskites with different structural complexities.
- 2., Antiferromagnetic Fe^{3+}-O^{2-}-Fe^{3+} superexchange interactions arising from an excess of Fe suppress the magnetic circular dichroism signal from Fe cations in ordered $Sr_2[Fe][Fe_{1/5}Re_{4/5}]O_6$, when compared with ordered $Sr_2[Fe][Re]O_6$.
- Dominant Fe^{3+}-O^{2-}-Fe^{3+} antiferromagnetic coupling in disordered $Sr[Fe_{4/5}Re_{1/5}]O_3$ leads to a decrease in magnetic circular dichroism signal down to the noise level.