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## Design of functional nanostructures *via* chirality induction

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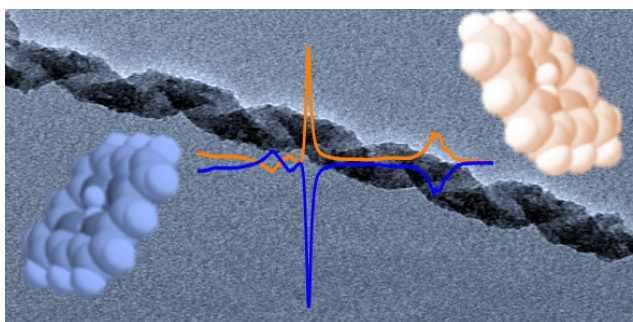
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While the combination of chiral and magnetic properties is becoming more and more attractive for magneto-chiral phenomena, the fabrication of chiral systems that are highly responsive to both



*Electron microscopy image of TPPS porphyrin aggregated at the surface of a silica nanohelix and the CD spectra induced by the helices left and right.*

light and magnetic fields is still a challenge.<sup>1,2</sup> The induction of chirality to achiral objects is a versatile strategy worthy of exploration for the preparation of magneto-chiral objects. In this context, we investigate the use of silica nanohelices as a chiral platform for induced circular dichroism (ICD) to achiral magnetite nanoparticles, as well as achiral free base or metallized porphyrins.<sup>3,4</sup> These nanocomposites are studied principally by electronic natural circular dichroism (NCD) and

magnetic circular dichroism (MCD) spectroscopies, and discussed as potential candidates for magnetochiral dichroism.

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### **REFERENCES:**

1. M. Atzori, H. D. Ludowieg, Á. Valentín-Pérez, M. Cortijo, I. Breslavetz, K. Paillot, P. Rosa, C. Train, J. Autschbach, E. A. Hillard and G. L. J. A. Rikken, *Sci. Adv.*, 2021, 7, eabg2859.
2. M. Atzori, K. Dhbaibi, H. Douib, M. Grasser, V. Dorcet, I. Breslavetz, K. Paillot, O. Cadot, G. L. J. A. Rikken, B. Le Guennic, J. Crassous, F. Pointillart and C. Train, *J. Am. Chem. Soc.*, 2021, 143, 2671–2675.
3. Y. Okazaki, J. Cheng, D. Dedovets, G. Kemper, M.-H. Delville, M.-C. Durrieu, H. Ihara, M. Takafuji, E. Pouget and R. Oda, *ACS Nano*, 2014, 8, 6863–6872.
4. A. Scalabre, Y. Okazaki, B. Kuppan, T. Buffeteau, F. Caroleo, G. Magna, D. Monti, R. Paolesse, M. Stefanelli, S. Nlate, E. Pouget, H. Ihara, D. M. Bassani and R. Oda, *Chirality*, 2021, 33, 494–505.

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