

From functional silicates to organic-inorganic hybrids

João Rocha

Department of Chemistry, CICECO-Aveiro Institute of Materials, University of Aveiro, 3810-193, Aveiro, Portugal

Nanoporous zeolite-like metal silicates and metal-organic frameworks (MOFs) are a material chemists' playground and a toll box for engineering applications. While the former materials are highly robust, enabling applications in harsh conditions, the desired architectures are challenging to synthesise and to post-synthesis modification (PSM). In contrast, MOFs operate in milder conditions and often lack robustness, but they are amenable to 'rational synthesis' and PSM and, thus, to properties engineering. This talk encompasses both types of materials with emphasis on the latter. A first example comprises zirconium silicates [1] now market drugs for treating hyperkalemia (excess K^+ in serum). MOFs are being assessed in health-related applications and here I show that calcium bisphosphonate MOFs are promising for treating bone diseases [2]. Mosquitoes are important disease vectors. MIL-125, a Ti-MOF, supported on textile fibres exhibits excellent anti-mosquito activity [3]. The design of nanomaterials for sensing molecules and temperature via light emission is a final challenge I shall address [4-6].

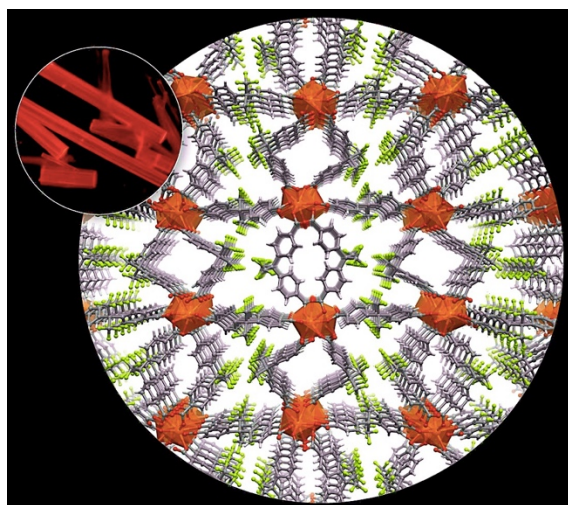


Fig. 1 – Example of a nanoporous Eu^{3+} -bearing MOF structure used to build an ethanol sensor [4]. Colour code: Eu polyhedra orange, O red, C gray, F green, H yellow). Inset shows micron-size crystals strongly luminescent under UV irradiation.

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- 1) Z. Lin, A. Ferreira, M. R., Soares, J. Rocha, *Inorg. Chim Acta*, **356**: 19 (2003).
- 2) Shi, F. N., Almeida, J. C., Helguero, L. A., Fernandes, M. H. V., Knowles, J. C., Rocha, J., *Inorg Chem.*, **54**: 9929 (2015).
- 3) Abdelhameed, R., Kamel, O., Amr, A., Rocha, J., Silva, A., *ACS Appl. Mater. Interfaces*, **9**: 22112 (2017).
- 4) B. V. Harbuzaru, A. Corma, F. Rey, P. Atienzar, J. L. Jordá, H. García, D. Ananias, L. D. Carlos, J. Rocha, *Angew. Chem. Int. Ed.*, **47**: 1080 (2008).
- 5) Z. Wang, D. Ananias, A. Carné-Sánchez, C.D.S. Brites, I. Imaz, D. Maspoch, J. Rocha and L. D. Carlos, *Adv. Funct. Mater.* **25**, 2824 (2015).
- 6) C. D. S. Brites, X. Xie, M. L. Debasu, X. Qin, J. Rocha, X. Liu, X. and L. D. Carlos, *Nature Nanotech* **851**, 11 (2016).

Presenting author: João Rocha, Department of Chemistry, CICECO-Aveiro Institute of Materials, University of Aveiro, 3810-193, Aveiro, Portugal; rocha@ua.pt