NEW METAL-ORGANIC FRAMEWORK $\{[Mg(HCOO)_3]DMF\}_n$: SYNTHESIS, STRUCTURE AND PROPERTIES

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Metal-organic frameworks (MOFs) materials as a class of coordination polymers have become a forefront in scientific research and public interest due to the potential for storage and gas separations. Although the formate ion is the simplest carboxylate linker, only a few compounds containing this ligand have been reported so far. [1,2]

Using solvothermal techniques, a new MOF was synthesised. A solution of $Mg(NO_3)_2 \cdot 6H_2O$ and imidazole in DMF was heated at 140 ºC for 72 hours in a 10 ml teflon-lined bomb, and cooled down to room temperature at a rate of 0.06 ºC/min. Small, colorless crystals were obtained in a yield of 32% .

Single-crystal X-ray study has demonstrated that the crystal structure of title compound represents a 3D coordination polymer with general formula $\{[Mg(HCOO)_3]\cdot DMF\}_n$. The guest molecules of DMF are statistically distributed over two resolvable positions within the cavities which can form coordination network and be easily removed by heating.

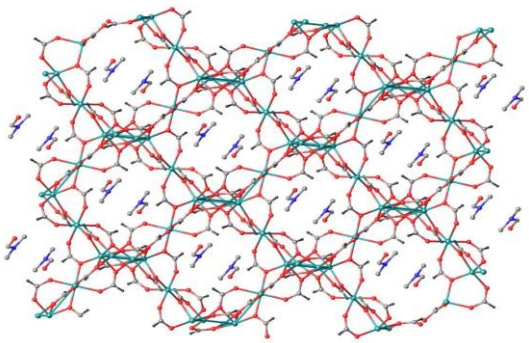

Figure. Perspective view of the 3D coordination polymer $\{[Mg(HCOO)_3]\cdot DMF\}_n$.

The structure of this material was verified by elemental analysis, IR and absorption spectroscopies. Thermogravimetric analysis shows that the framework is stable up to 350 ºC. Adsorption measurements proved that hydrogen uptake is two times higher in comparison with results obtained for nitrogen at the same temperature (77.4 K).

The high stability of this compound and the ability to take up gas molecules points to a promising way forward in assessing porous properties which could find applications in adsorption techniques.

References:

1. Viertelhaus M., Anson C. E., Powell A. K. *Z. Anorg. Allg. Chem.*, **631**, 2365 (2005).
2. Viertelhaus M., Adler P., Clérac R., Anson C. E., Powell A. K. *Eur. J. Inorg. Chem.*, 692 (2005).