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# Amine-functionalised mesoporous magnesium carbonate: dielectric spectroscopy studies of interactions with water and stability

Isabelle Pochard<sup>1,\*</sup>, Maria Vall<sup>2</sup>, Joakim Eriksson<sup>2</sup>, Camille Farineau<sup>1</sup>, Ocean Cheung<sup>2</sup>, Sara Frykstrand<sup>2</sup>, Ken Welch<sup>2</sup>, and Maria Strømme<sup>2,\*</sup>

<sup>1</sup> Laboratoire UTINAM, UMR 6213 CNRS-Université Bourgogne-Franche-Comté, Besançon, France

<sup>2</sup> Nanotechnology and Functional Materials, Department of Engineering Sciences, The Ångström Laboratory, Uppsala University, Box 534, 75121 Uppsala, Sweden

## **Abstract**

A mesoporous magnesium carbonate (MMC) material that was first described in 2013 is currently being investigated for several industrial and life-science-based applications. In this paper, the effect of functionalising the surface of MMC with amine groups on the water interaction properties of the material is investigated in detail. Amine functionalisation enhanced the stability and water sorption-release properties of the material. This is explained by the low affinity between amine-functionalised MMC and water molecules, as attested by the high free/total water ratio shown by dielectric spectroscopy. This low affinity had an impact on the total amount of adsorbed water at low relative humidities (RHs) but not at high RHs. The functionalisation of MMC with amine groups also stabilised the material in moist environments, hindering spontaneous crystallisation. These results provide a more fundamental understanding of the water interaction properties of MMC and are also expected to facilitate optimisation of the stability of materials like this for novel drug formulations and other life-science applications, as well as for their use in humidity control.

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