

Non-porosity, Porosity, Multi-porosity: the Disordered life of Calix[n]arenes in the Solid-state

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In this talk I would like to look at various aspects of porosity – including the real nature of porous solids i.e. that they allow things to pass through them – with regard to calix-arene materials. I will show that seemingly non-porous materials are highly porous and have very high stability towards absorption/desorption and various types of porosity can exist not only in macroscopic systems but even with regard to different types of channel in a crystal. How much of this is due to disorder is an interesting and indeed metaphysical question but if gases or volatile organics can flow rapidly into and out of solids with disorder we have to pose question about fluidity in the solid state.

Concrete examples will be given for my favorite molecules the calix-arenes:

We will show in the complex of para-sulphonato-calix[8]arene with bipyridylethane there are separate channels for water and the bipy moiety but with intriguing differences in polarity.

We will look at a model inverse micelle and see how care must be undertaken to show disorder and to ponder on the nature of fluidity.

We will spend quite some time on the gas sensing and uptake properties of various calix-arene type molecules. The work will be demonstrated by use of Surface Acoustic Wave sensors and will show how low one can get in vapor pressure. The hierarchical structures of the films used will be demonstrated.