

Nanoscale Organisation and Dynamics Group

University of Western Sydney

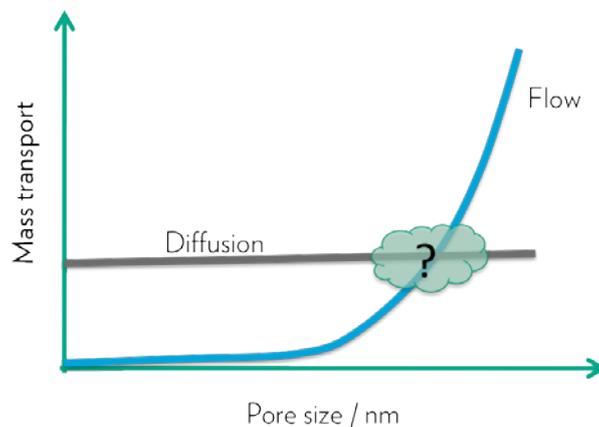


Diffusion and Flow in Soft Heterogeneous Materials

Professor Magnus Nydén
Professor of Applied Surface Chemistry
Ian Wark Research Institute,
University of South Australia
E-mail: magnus.nyden@unisa.edu.au

Three parameters decide the rate by which a liquid or a solute in a liquid moves through a soft material:

1. Microstructure
2. Surface interactions between the materials and solute/liquid
3. Structure dynamics



The *microstructure* in soft materials is inherently spatially heterogeneous since it is formed by weak (soft) interactions. This makes it virtually impossible to predict mass transport rates in, into, from or through them. *Surface interactions* add to this complexity. Strong surface interactions in materials with large surface area can completely dominate the diffusion in materials, even if the microstructure does not offer any significant obstructive effect in itself. *Structure dynamics* can be a major player in soft materials, especially for large particles moving in crowded surroundings. Taken together, these three parameters, underpinned by the random fluctuation in spatial density in soft materials, suggest that closed analytical expressions for mass transport are impossible.

Is it hopeless? Can we ever understand the relationships between fluid motion and microstructure in heterogeneous materials?

In an approach to predict the effect of microstructure and surface interactions the research program SuMo Biomaterials at Chalmers was formed in 2008. The scientific basics for the research area titled **QMMR**, **Quantitative Microstructure Mass transport Relationships** will be explained and put into the context of the interacting research disciplines in the program.

The talk will also include a short review of other ongoing research projects in my group and I will also discuss some of those I intend to start in Australia. My hope is that all of the above will inspire questions and ideas on how we can collaborate in the future.

Prof Magnus Nydén, Director and Professor of Applied Surface Chemistry at the Ian Wark Institute. He obtained his PhD the University of Lund, Sweden. Prior to his current appointment, Magnus was Professor of Surface Chemistry at Chalmers University of Technology in Sweden. His research interests are centred on diffusion and flow in porous soft materials. In particular, spatial heterogeneity and surface effects on diffusion in model particle materials. His goal is to develop a better understanding of these effects to develop new materials and methods.

Staff and students at all levels are welcome to attend.

Venue and Time:

This talk will be held on Friday June 8 at 2:00 at the Campbelltown Campus in Building 30 (Medical School), Small Lecture Theatre (CA-30.G.213).

Enquiries:

Prof. William S. Price

Ext. 3336

e-mail: w.price@uws.edu.au