

Making smarter hydrogels for drug delivery

THE PROBLEM TO SOLVE:

HYDROGEL STRUCTURE

BioModics is an innovative Danish company bringing to market medical devices that can reduce hospital acquired infections. BioModics's patented technology, which incorporates a hydrogel in silicone in a so-called interpenetrating polymer network (IPN), decreases the risk of infection by preventing biofilm formation. The IPN-silicone is also used in drug delivery when inserted in a catheter (Fig. 1). To understand the material's capabilities for drug delivery, it is important to know the structure of the IPN network in order to optimise it.

A STEP TOWARDS THE SOLUTION

BioModics conducted neutron measurements with collaborators at the University of Copenhagen. They performed small-angle neutron scattering (SANS) experiments on a series of IPN samples at the Institut Laue Langevin, France.

SANS appears to be the best technique to enable visualisation of the specific hydrogel structure and to investigate its capabilities for drug transport in medical applications.

THE RESULT

These initial measurements confirm that the hydrogel in the IPN samples absorb water, and that the current commercial material do not take up water, as evidenced by the fact that the scattering increases significantly (Figure3) when the IPN-samples are loaded with heavy water (D2O).

"The measurements provided by the SINE2020 programme verified that the hydrogel structure in our samples could be studied with SANS, and enabled us to decide on purchasing beam time for a detailed study of the effect of processing conditions on the hydrogel structure"

Martin Alm, head of polymers, BioModics

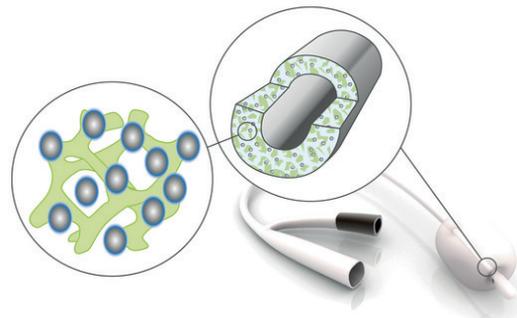


Fig. 1 At the core of Biomodics' IPN technology is the ability to impregnate silicone medical tubing with a cross-linked polymer aqua gel

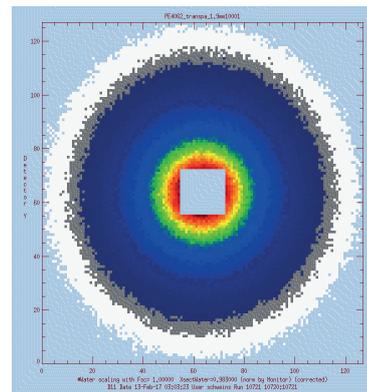


Fig.2 Raw data obtained by small angle neutron scattering on BioModics samples

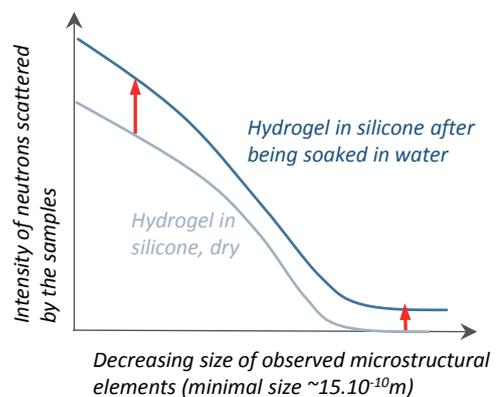


Fig3. Analysis of scattered intensity showing absorbing properties and hydrogel structure

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