From lipid-loaded hydrogels to functionalized dry-films

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We have recently reported on successful blending of thermoreversible polysaccharide hydrogels of methylcellulose, κ-carrageenan, and their 1:1 mixture [1] with internally self-assembled particles ISAsomes [2,3]. Highly stable self-assembled thermo-gelling emulsions that were characterized utilizing SAXS, DSC, DLS, and oscillatory rheological experiments were obtained [4,5]. These systems are structured on three hierarchical levels: gelified polymer network, dispersed emulsion particles and their self-assembled interior. The ISAsomes and also the thermogelling properties of the polymers stay practically intact during such blending. The appearance (gel/sol) and the internal structure of these systems can be easily tuned by the temperature changes. Systems with up to 2 % of hydrogelling polymer and different loadings of ISAsomes (up to 25 %) were studied. They contained up to 93 % of water – depending on the concentration of polymers and ISAsomes in them. Our present SAXS, SLS and DLS study focuses on drying of such systems to obtain functionalized dry-films. As will be also shown, such polymer films loaded with lipid/oil phase can be resolubilised to re-establish the thermogelling ISAsome/polymer systems. ISAsomes being highly functional particles due to their excellent performance in terms of carrier systems for various hydrophilic, hydrophobic and/or amphiphilic molecules yield such solid films interesting as potential candidates for intermediate storage, delayed release or even selective absorption media.