Silicone Hydrogels and their Surface Characteristics

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Silicone hydrogels, unlike its conventional counterparts, are recently receiving more popularity in ***health & wellness*** markets owing to its matrix structure in adjusting key parameters, such as oxygen transport, water retention & unique interfacial properties [1-2]. The present study highlights one such effort to create, understand and correlate the properties of hydrogels made out of 3-[Tris(trimethylsiloxy)silyl]propyl methacrylate (TRIS), 2-hydroxyethyl methacrylate (HEMA) and N,N-Dimethylacrylamide (DMA). The hydrogel structures so created are strongly influenced by mode of curing and curing kinetics of the monomers. Thermal curing being more slow and defined, the curing follows the reactivity ratio law and organized structures are formed which leads to dispersed incorporation of TRIS monomer by which the phase separation is kept to a minimum. In contrast, UV cured formulations in general have fast kinetics and more water content than thermally cured materials. These hydrogel structures can influence the arrangement of water molecules immobilized within the matrix. As the amount of TRIS is increased, the calorimetric data showed a decrease in freezable water and an increase in non-freezable water with strong immobilization of water within the hydrogel matrix. The cumulative effect of three states of water (i.e. free, freezable bound and non-freezable bound) and detailed understanding of such interaction between the water molecules within the polymer for a given system provides insight into its hydrated state, water retention capacity and also the oxygen diffusive properties.

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