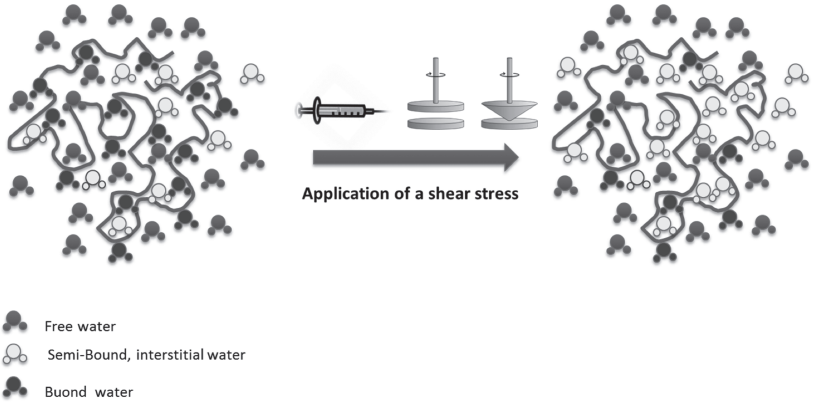

Fig. 6. Schematic drawing showing the arrangement of water molecules inside a polysaccharide-based hydrogel in the native state and after a mechanical stress (like a syringe or rheometer). It shows the different arrangement of some water molecules passing from a bound water state to a semi-bound water state (Adapted from Pasqui et al. 2012).

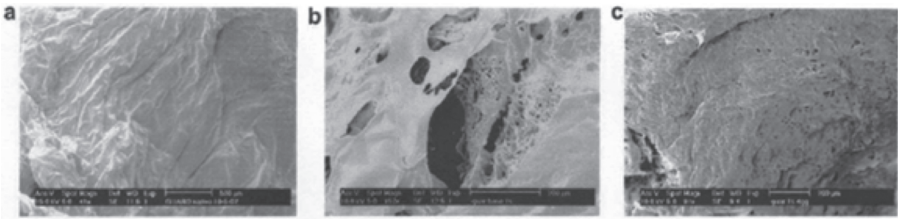

Fig. 7. SEM images of (a) the native GG hydrogel, (b) the GG hydrogel after mechanical stress and (c) the GG hydrogel after 4 days of setting (Barbucci et al. 2008).

The presence of nanoparticles (overall diameter of 27 nm) is observed all over the surface of the gel. Leaving the hydrogel in a quiescent condition for 2, 3 and 24 hr, the particle diameter increases (52 nm) as time elapsed and the particles interpenetrate each other, moving the hydrogel back to its original morphology. After 24 hr, the nanoparticles are present only in a few parts of the surface, while the major parts of the surface are completely rearranged into a homogeneous structure (Fig. 8).

Applications

Interpenetration Hydrogels (IPH)

A new class of hydrogels can be developed, formed by two different thixotropic hydrogels and called Inter Penetrating Hydrogels (IPH) (Barbucci et al. 2011). The preparation procedure is simple because it does not use chemical reactions. Exploiting their thixotropic properties, two hydrogels must be converted to liquid using two independent syringes, so as to mix them mechanically in the liquid form. Another method consists in putting the two hydrogels in the same syringe and then, by moving the piston up and down, avoiding the release of the gels, exerting an adequate pressure