Slow relaxations and aging of gelatin gels

Tristan Baumberger,* Christiane Caroli, and Olivier Ronsin

Institut des Nanosciences de Paris, Sorbonne universités, UPMC univ Paris 6 and CNRS-UMR 7588, 4 place Jussieu, F-75252 Paris, France

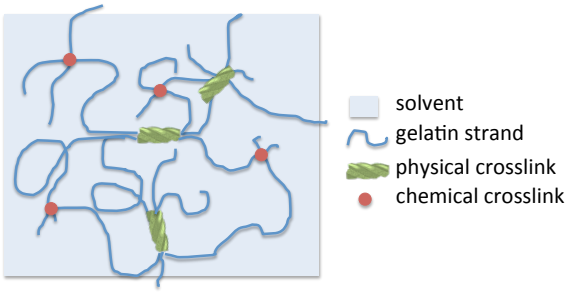

FIG. 1. Gelatin gels can be formed by standard thermoreversible gelation upon cooling and/or by forming covalent bonds. Tailored hybrid gels containing both "physical" and "chemical" crosslinks makes it possible to study e.g. the effect of the restriction of the parameter space accessible to the structural rearrangements responsible for slow aging and stress relaxations.

Gelatin gels, the archetype of thermoreversible hydrogels, are obtained by partial renaturation of the native collagen triple helices upon cooling. These act as extended crosslinks for the polypeptidic coils to form an elastic polymer network. The resulting gels exhibit the slow dynamical behavior characteristic of soft glassy materials : slow logarithmic aging of the shear modulus and stress relaxations à la Kohlrausch.

Gelatin gels can be termed experimental model systems in view of the versatile physico-chemical and mechanical toolbox available (cf. Fig.1), which makes it possible to probe the relaxation dynamics in the complex energy landscape at various time and length scales, both in the linear and extremely non-linear (fracture) response regimes.

I will review the salient features of this slow dynamics with emphasis on intriguing issues which remain open for further theoretical and computational investigations.

* Corresponding author: baumberger@insp.jussieu.fr

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