Supporting Information

Cross-Linking of COOH-Containing Polymers Using Ag(I)-Catalyzed Oxidative Decarboxylation in Aqueous Solution

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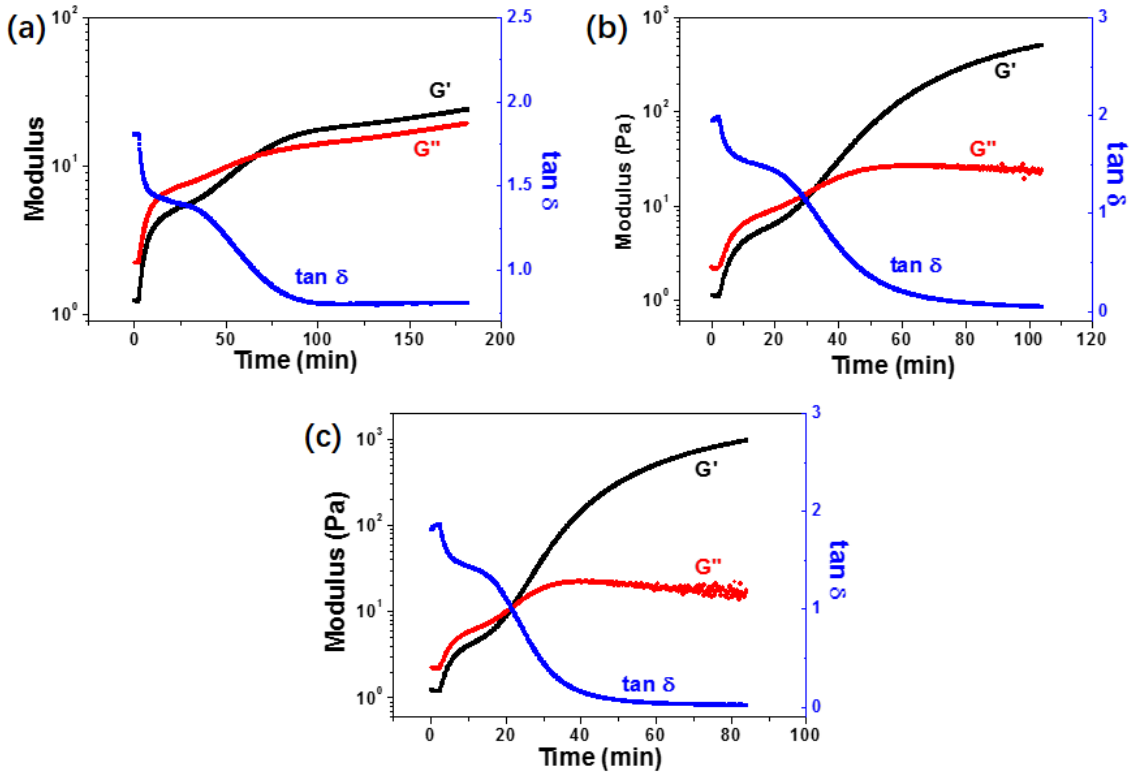

Figure S1. The gelation kinetics of home-made PAA at various ratios of $AgNO_3$ measured by dynamic rheology at room temperature: (a) 0.03 wt%, (b) 0.06 wt% and (c) 0.12 wt%. All PAA solutions contain residual APS from polymerization as described in the experimental section. Home-made PAA showed a shorter induction period but an additional stage for network development where a slow increase of G' and G" with gelation time was seen after the induction period. This trend is possibly due to the further polymerization of unconverted AA in home-made PAA. Due to the existence of residual AA, the t_{gel} of home-made PAA is also shorter than that of the commercial PAA at 0.06 and 0.12 wt% of $AgNO_3$. The presence of residual AA monomers is expected to accelerate the formation of networks by increasing the concentration of free radicals.

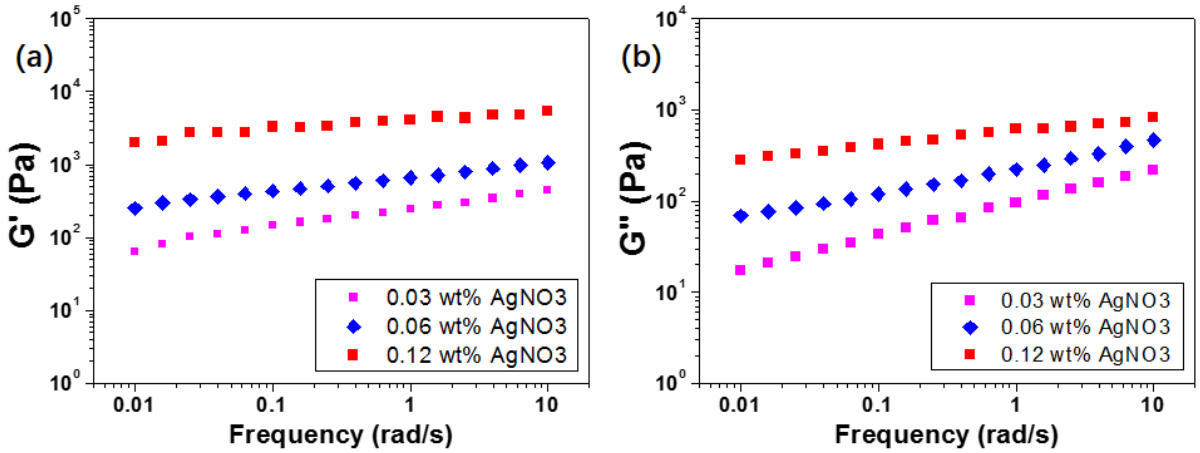

Figure S2. Dynamic frequency sweep of PAA60/PVA40 hydrogels incorporation of 0.03 wt%, 0.06 wt% and 0.12 wt% $AgNO_3$: (a) G' vs shear frequency. (b) G" vs shear frequency. As increasing $AgNO_3$ amount from 0.03 wt% to 0.12 wt%, the viscoelastic moduli within the whole frequency range are promoted continuously. It suggests that more Ag(I) ions lead to a higher cross-linking density of hydrogels and the improvement of the mechanical toughness significantly.

Table S1. Mechanical properties of the IPN hydrogels with different PAA/PVA mass ratios*

Entry	PAA/PVA ratio (w/w)	Tensile strength (kPa)	Strain at ruputure	Elastic modulus (kPa)
1	100/0	15.1±2.1	3.4±0.2	6.65±0.51
2	80/20	22.3±1.1	26.1±1.2	0.29±0.02
3	60/40	21.2±1.4	21.6±0.8	0.31±0.03
4	50/50	16.4±1.0	17.1±0.9	0.79±0.02
5	40/60	15.3±0.9	11.8±0.7	1.03±0.03
6	20/80	29.1±1.7	9.0±0.7	1.97±0.06
7	0/ 100	22.3±2.0	6.4±0.2	1.01±0.08

$AgNO_3$ concentration is 0.6 wt%. Table S1 shows the tensile strength, maximum elongation and elastic modulus can be readily tuned by varying PAA/PVA weight ratios.