# New Insights in Supramolecular Hydrogels

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Over the past decades, hydrogels have been widely investigated through the study of chemically (permanent) or physically (non-permanent) cross-linked networks. More recently, both cross-linkers have been introduced into the same network to take advantage of combined effects like using sacrificial bonds as efficient energy dissipaters. Our work falls directly within the scope of this trend. The objective of the present work is to synthesize dual hydrogels by mixing chemical and physical cross-links to precisely modulate the gel properties according to the aimed application. Thus, we developed an electrostatically charged supramolecular cross-linker based on coordination chemistry that allows us to prepare dual gels through a one-pot synthesis. So far, we have been studying both kinds of cross-link separately to fully understand the link between the structure of the synthesized hydrogels (via dynamic light scattering and NMR spectroscopy) and their properties. Interestingly, supramolecular hydrogels show rheological properties and a structure very similar to the chemically cross-linked network whereas an atypical swelling behavior is observed. The study of those synthesized gels focuses on the deep understanding of this surprising behavior, before mixing the two types of cross-link into a unique network in order to extend the range of properties of those fascinating materials.