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The chemistry of cyclodextrins (CDs) and their ability to form stable, non-covalent inclusion complexes with a large variety of organic molecules has been extensively studied by an impressive repertoire of physical and spectroscopical methods. Suffice to mention here NMR spectroscopy, vibrational spectroscopies, X-ray diffraction, thermal methods, electronic microscopies (SEM, TEM), light, X-ray and neutron scattering. The CDs inclusion complexes still rise applicative interest in many different fields, ranging from the drug delivery to the environmental remediation.

More recently, CDs have been exploited as monomer for obtaining cross-linked polymers. This class of compounds provides materials characterized by high sorbent capability towards both organic and inorganic species. Although they find a broad range of applications, their structural and dynamic characterization is still a challenge, mainly due to their amorphous state. This communication will focus on case studies of cross-linked polymers obtained either from CDs or from different types of oligo- and polysaccharides. The main investigating tool is NMR spectroscopy, especially by high resolution magic angle spinning (HR-MAS) techniques. Some examples of the dynamics of organic molecules encapsulated in polymeric hydrogels will be presented and discussed.

Keywords: CD polymers, CD nanosponges, HR-MAS NMR, vibrational spectroscopies.