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Understanding the Structure of Gels Using X-ray Scattering Methods

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Many commonly used pharmaceutical and healthcare products are based on hydrogels, where an extremely small amount of a 3D fibre network supports a large volume of solvent leading to solidlike properties. Designing new hydrogel materials for specific applications such as tissue engineering is challenging; there is no definitive way of telling what systems will successfully form a gel, and many of the traditional methods for analysing nanoscale structure such as TEM and AFM mean that the native gel structure cannot be properly elucidated in 3D. We have developed a number of tools using x-ray and neutron scattering to fully characterise novel hydrogel materials made from small molecules based on peptides, and in this talk will demonstrate how scattering techniques can be used to better understand how gels are formed, the structural transitions which occur during gelation, and ultimately lead to the design of better biologically relevant gels for applications such as tissue engineering.