**Use of cellulose microfibrils and potato protein to form double network gels**

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The formation of double network hydrogel systems is investigated using cellulose microfibrils from citrus fibre and a thermally gelling potato protein. We study how the system transitions from a single, to a double network gel, as the potato protein is thermally denatured, and it forms a second network entangled within the network of cellulose microfibrils. The system is studied via oscillatory rheology, namely temperature and amplitude sweeps. We find that the contribution of the native potato protein on the single network cellulose microfibril gel is minimal. However, when the protein is thermally denatured, the cellulose microfibrils and gelled protein act synergistically to contribute to the storage modulus of the double network gel. At low protein concentrations, the addition of the cellulose microfibril network reduces the minimum protein concentration for gel formation. At low to moderate protein concentrations, the cellulose network interpenetrates the protein network, significantly increasing the elastic modulus. At high concentrations of protein, the protein gel network entirely dominates the rheological response. This is observed up to a certain ratio of protein to fibre. We link the observed rheological properties to the microstructure via confocal laser scanning microscopy. Flocs of the cellulose microfibrils are observed with the secondary protein network entangled throughout. These dense flocs are likely to be the key contributor to the increased mechanical properties of the double network system.