Drying dipeptide hydrogels: a SANS study

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Hydrogels are widely studied materials with wide ranging applications from medical to organo-electronic applications and the properties of the self-assembled fibres, which form the network, are key to the overall gel properties.[1] Studies of these fibres frequently employ microscopy techniques to determine their dimensions.[1,2] However, those that can probe the smallest dimensions of the fibres, such as TEM and SEM, require the sample to be dried or frozen in the case of cryo-TEM. Therefore, small angle neutron scattering (SANS) offers a powerful tool for measuring the dimensions of the fibres averaged over a large sample area under both wet and dry conditions. We present results from scattering experiments and microscopy on a selection of gels made from low molecular weight dipeptide gelators. In some cases, the data are in accord; however, there are examples where it is clear that drying leads to a significant change in the fibres. We highlight the importance of using complementary techniques across both real and reciprocal space to gain a full understanding of the dimensions of fibres in hydrogels.

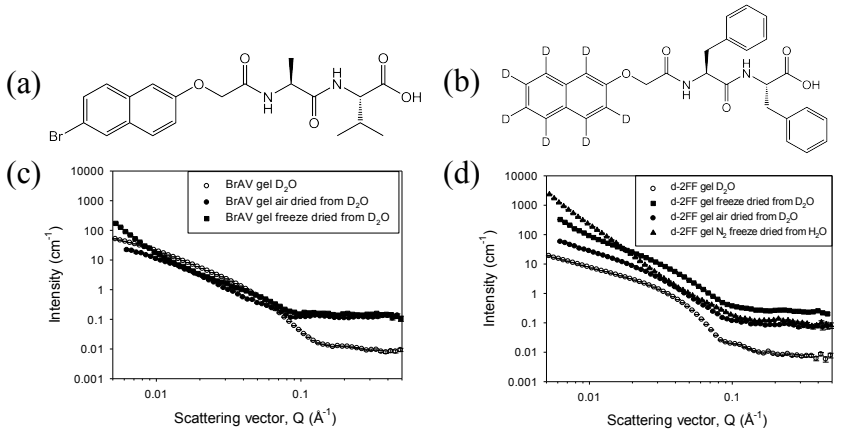

Figure: (a) Structure of gelator BrAV and (b) d-2FF. (c) Plots of SANS data for the fully hydrated air and freeze dried gels of BrAV and (d) the same including an impact freeze dried sample of d-2FF.

1 L. Chen, J. Raeburn, S. Sutton, D. G. Spiller, J. Williams, J. S. Sharp, P. C. Griffiths, R. K. Heenan, S. M. King, A. Paul, S. Furzeland, D. Atkins and D. J. Adams, *Soft Matter*, **2011,** *7*, 9721.
2 K. L. Morris, L. Chen, J. Raeburn, O. R. Sellick, P. Cotanda, A. Paul, P. C. Griffiths, S. M. King, R. K. O'Reilly, L. C. Serpell and D. J. Adams, *Nature Communications,* **2013**, *4*, 1480.