

Polyacrylamide (PAG) gels are used in magnetic resonance imaging radiation dosimetry. The PAG dosimeter is based on the radiation-induced co-polymerisation and cross-linking of acrylic monomers infused in a gel matrix. An understanding of the mechanisms and kinetics of the co-polymerisation processes are required in order to optimise existing PAG dosimeter systems as well as develop new ones. Fourier transform (FT) spectroscopy studies, using a Perkin-Elmer System 2000 FT-Raman spectrometer were undertaken to investigate cross-linking changes during the co-polymerisation of PAG. PAG was manufactured according to the method described by Baldock *et al* with a composition of 5% gelatine, 3% acrylamide and 3% N,N'-methylene-bis-acrylamide by mass, with distilled water as the remaining constituent. Principal Component Regression was performed on Raman spectra of PAG samples irradiated to 50 Gy. A model was developed using cross-validation to establish the absorbed radiation dose of an unknown PAG sample from the Raman spectra. The calculated correlation coefficient between measured and predictive samples was 0.997. This indicates that FT-Raman spectroscopy has the potential in radiation dosimetry as a means by which the dose response of PAG may be assessed.

Baldock.C, Burford.R.P, Billingham.N.C, Wagner.G, Patval.S, Badawi.R.D, Keevil.S.F. Experimental procedure for the manufacture and calibration of polymer gels for radiation dosimetry using MRI. *Phys. Med. Biol.* 43 (1998) 695-702.