

Study of the relation between structure and stress in elastomers

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Elastomers form a very important role in our daily lives, being incorporated in products ranging from footwear to automobiles to biomedicine. The elastic and plastic properties of elastomers are determined by the choice of polymeric components and their subsequent heat treatment. It is of importance to determine the relationship that exists between the elastic properties of the elastomer and its structure.

This paper describes data acquired during recent experiments at the Photon Factory using the BIFDIFF diffractometer at the Australian National Beamline (BL20B). Use was made of the sagittal focusing monochromator to produce a beam size of $40\ \mu\text{m}$ x $40\ \mu\text{m}$ dimension at 1.739\AA . A tensometer was fitted to the theta-axis, and the scattered x-rays were recorded on imaging plates, which were mounted in a newly constructed imaging plate changer [G. J. Foran and I. A. Gentle (1996) *Langmuir*, to be published]. Ten imaging plates can be mounted in this changer. Two minute exposures were taken at approximately two minute intervals during the course of a loading and unloading cycle during which a maximum strain of 320% was achieved.