

SAXS Studies of Leather

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Leather is a fibrous collagen material. Leathers from different animals have different physical properties. High strength leather has much greater commercial value than weak leather, therefore understanding the basis of the strength is an important goal. Other collagen based materials are important in medical applications. We used small angle X-ray scattering to characterise the structure of leather and other fibrous collagen materials. The two dimensional small angle scattering pattern provides information on the internal fibril structure and the fibril arrangement. Leathers from different animals were characterized. It is shown that greater collagen alignment in the plane of the leather leads to stronger material. The structural response to dynamic loads varies between strong and weak material. Under tension fibrils reorient at low strain then individual fibrils stretch at higher strain. Stronger material has more uniform strain throughout the thickness and greater extension of fibrils is achieved. Processing treatments affect the response of these tissues to strain. Cross linking influences the fibril orientation. These studies provide an insight into the structural basis of strength in leather and the behaviour of these materials under stress.
