

Abstract

Intrinsically Coloured Red Aromatic Polyamides [†]

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Abstract: Aromatic polyamides or aramids are materials with exceptional thermal and mechanical properties. For this reason, they are considered high-performance materials with many applications in fields such as civil security (bullet-proof body armour or fire, chemical, and saw protection suits), transport (automotive and aerospace), and civil engineering, among many others. The remarkable properties arise from the high cohesive energy due to their chemical structure, including the rigidity of the main chain due to the wholly aromatic structure conjugated with the amide groups, the high average bond energy, and a strong and highly directional interchain hydrogen bonds between the amide moieties. Although the natural yellowish colour of the fibres is used, generally, most of the applications require coloured fibres. However, aramid fibres have poor dyeing properties for the same reasons that make them thermally and mechanically resistant, and traditional dyeing methods, such as dope dyeing, are inefficient and aggressive, which impairs the fibres' properties. The ideal colour fastness of fibres is achieved by intrinsically, inherently, or self-coloured polymers by introducing a dye motif or chromophore monomer in the chemical structure of the polymer. In addition, the colour hue can be controlled by tuning the chromophore monomer molar content in the final composition. In previous research, we successfully obtained inherently blue-coloured aramids, with blue chromophore motifs unable to migrate and evenly distribute along the polymer chain and maintain their high-performance properties, and our aim now is to obtain red-coloured aramids prepared in the same fashion.

Keywords: red aromatic polyamides; chromophore monomer; self-coloured polymers; high-performance polymers



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