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## Effect of tin fluoride content on the structure and properties of phosphate glass – polyamide 11 hybrids

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### ABSTRACT

This research investigates tin-fluoride phosphate glasses as liquid-phase fillers in polyamide 11. Optimizing the tin-fluoride content was shown to reduce the glass-transition temperature of the glass down to 106°C and enable both constituents of the composite to be fluid during processing. During extrusion, the phosphate glass was elongated into threads and ultimately broken up into droplets. The interaction parameter between the phosphate and polyamide was found to be -0.012 due to molecular interactions and enhanced solubility of the ultrafine glass particles. All hybrids showed limited ductility due to the inability of the pinned polymer chains to be drawn into an expanding stable neck. However, there were major increases in both the Young's modulus and flexural modulus owing to the strengthening of molecular bonds by the phosphate-polyamide interactions.

**Key Words:** Glasses; Polymer-matrix composites; Mechanical properties; Microstructure.

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