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**Microstructure Evolution Effect on High-temperature Thermal Conductivity of LDPE/BNNS****Investigated by In-situ SAXS**

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**Abstract**

The low-density polyethylene (LDPE) and its composites incorporated boron nitride nanosheets (BNNS) ( $\leq 5$  wt%) were fabricated and their thermal conductivities ( $K$ ) as a function of temperature (20-80 °C) were measured. The  $K$  of the composite filled with 5 wt% BNNS increased 22 % at room temperature and 48 % at a high-temperature (below melting point) compared with pure LDPE. In order to reveal the enhancement mechanism for the high-temperature  $K$  of the composites, the microstructure evolution of the samples with temperature increasing was investigated by in-situ Small Angle X-ray Scattering (SAXS). The results show that the structural stability with temperature increasing and the lower interfacial thermal resistance are favorable for high-temperature  $K$  of the composites. This work provides a new recognition for the effect of microstructure evolution on high-temperature  $K$  of LDPE-based composites. It is hoped that the research will be instructive for enhancing  $K$  of LDPE-based composites by low-content doping and making them well-suited for the high-temperature practical applications.

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