Original
Received December 30, 2021
Accepted for Publication March 2, 2022

Effect of Annealing on the Temperature Dependence of Resistance in Polyethylene/Carbon Black Composites

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This study aimed at elucidating the effect of annealing on the positive temperature coefficient characteristics of polyethylene/carbon black (PE/CB) composites. The PE/CB composite was annealed at 140, 150 or 160°C, and the temperature-dependence of its resistance was measured. The internal morphologies of the PE/CB composites with different annealing temperatures were observed using a scanning electron microscope, to verify the optimum annealing conditions for obtaining highly reproducible temperature dependence of resistance. It was shown that the resistance in the PE/CB composite increased with the percentage of inside cracks, which was closely related to the reproducibility of the temperature dependence. Finally, the optimum annealing temperature for the targeted PE/CB composite was estimated to be 150°C.

Keywords : Positive Temperature Coefficient Characteristics; Composites; Annealing