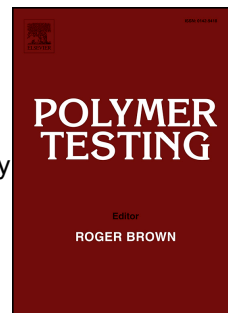


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# Poly(lactic acid)-based polymer composites with high electric and thermal conductivity and their characterization

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## ABSTRACT

Electrically and thermally conductive polymer composites on the basis of biodegradable poly(lactic acid) (PLA) were developed and studied in this work. Pristine single-walled carbon nanotubes (CNTs) and powder of natural graphite (G) were used as fillers in polymer composites. PLA-based composites were prepared by melt-compounding method. The volume resistivity of PLA/CNT composites can be changed by more than ten orders of magnitude compared to that for neat PLA. The thermal conductivity of PLA/G composites can be changed from  $0.193 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$  (neat PLA) up to  $2.73 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ . Loading small quantity of CNTs into PLA/G composites increases the thermal conductivity not less than by 40 % of magnitude. Besides, all developed PLA-based composites are suitable for processing by injection molding, extrusion or additive manufacturing technology (3D printing).

*Keywords:* Poly(lactic acid), Electrically and thermally conductive polymer composites, Dielectric spectroscopy, Thermal conductivity, Melt flow index

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