Hydrothermal Synthesis of Perovskite $La_{1-x}Ca_xMnO_3$ Nanomaterials for Thermoelectric Composites

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Thermoelectric materials have attracted as a potential energy harvesting using its unique characteristic of Seebeck effect. Thermoelectric effect, which is defined as a generated electric voltage by direct conversion of temperature difference, exhibits high power density of ~ 1000 μW/cm^3 from energy source of thermal gradient. Figure of merit of thermoelectric materials is [$ZT = S^2\sigma/k$], where S is Seebeck coefficient, σ is electrical conductivity and k is thermal conductivity. Recently, perovskite La-based manganese have interested as a promising thermoelectric materials due to its adjustable electrical and Seebeck characteristics. In this study, we have conducted a materials study on perovskite $La_{1-x}Ca_xMnO_3$ (LCMO, x = 0.1 ~ 0.5), which were hydrothermally synthesized with post thermal treatment. The LCMO nanomaterials exhibit clear crystal structure of orthorhombic phase and were mixed in PEDOT:PSS matrix for thermoelectric polymer composites. Seebeck coefficient, electrical conductivity and power factor of the polymer composites were investigated with variation of LCMO composition for high thermoelectric characteristic.