Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C1-015



# Microstructure and thermoelectric properties of $Sr_{0.9}La_{0.1}TiO_3$ ceramics with nano-sized metal particles as additive

**Mengjie Qin, Gaogao Dong, Jie Xu, Yi Zhang** and **Feng Gao**
Northwestern Polytechnical University, China

$Sr_{0.9}La_{0.1}TiO_3$ thermoelectric ceramics with nano-sized Ag ($Sr_{0.9}La_{0.1}TiO_3$/xAg, x=0.05, 0.10, 0.15, 0.20) and Ti ($Sr_{0.9}La_{0.1}TiO_3$/yTi, y=0.05, 0.10, 0.15, 0.20, 0.30, 0.40) metal particles as additives were prepared by conventional solid state reaction method, and the influences of metal particles adding content on the microstructure and thermoelectric properties were investigated. XRD characterization confirmed that the main phase was perovskite $Sr_{0.9}La_{0.1}TiO_3$, along with a small amount of metal phase. SEM images showed that all of the samples were dense, and the metal particles accumulated at the grain boundaries, to form a complex network, contributing to increasing the electrical conductivity. Raman spectra of samples before and after annealing in Ar+C atmosphere showed a great difference, resulting from the creation of oxygen vacancies and changes in the Ti-O bond vibration and rotation modes. Adding nano-sized metal particles can increase the electrical conductivity and improve thermoelectric properties effectively. The maximum *ZT* value of 0.37 was obtained for $Sr_{0.9}La_{0.1}TiO_3$/0.30Ti samples at 1073 K, accompanying with the relative high Seebeck coefficient of -336 μV/K and low thermal conductivity of 2.14 W/m/K. This work suggested a route for using nano-sized metal particles to enhance the thermoelectric properties of oxide thermoelectric ceramics.

qinmengjie_2014@126.com