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M. Matsubara, Y. Masuoka, R. Asahi

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## Effects of doping IIIB elements (Al, Ga, In) on thermoelectric properties of nanostructured n-type filled skutterudite compounds

M. Matsubara<sup>a</sup>, Y. Masuoka<sup>a</sup> and R. Asahi<sup>a,b</sup>

<sup>a</sup>*Toyota Central R&D Laboratories, Inc., Nagakute, Aichi 480-1192, Japan*

<sup>b</sup>*Toyota Technological Institute, Hisakata 2 - 12 - 1, Tempaku, Nagoya 468 8511, Japan*

### Abstract

The optimization of the filler composition and nanostructuring is crucial for improving the thermoelectric properties of filled skutterudite compounds. Nevertheless, their simultaneous optimization is often difficult. In this study, group IIIB elements, which were not systematically investigated before as filler elements, were emphasized. Results revealed that group IIIB elements, particularly Al, effectively enhanced the electrical conductivity and decreased the lattice thermal conductivity. Nanostructured samples exhibited an ~20% enhancement of the thermoelectric figure-of-merit ZT, whereas the effects of the Al filler were not tangible in ZT because of the low solubility limit of Al and the high thermal conductivity of electron carriers.

### Keyword

thermoelectric materials; skutterudite; n-type; nano structure; group IIIB elements

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