

The collaboration research for the Dual Graduate School between VNU and JAIST

[Title of collaboration research]

Research and development on nanoscopic thermoelectricity

[The members of collaboration research]

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<http://www.jaist.ac.jp/ms/thermoelectronics/index-e.html>

[Other references]

- Dr. Thesis (JAIST), Synthesis and Thermoelectric Properties of Fine-grained Bi₂Te₃ Alloys, D.H. Kim
- Proc. 25th Int. Conf. on Thermoelectrics (2006),
Enhancement of the Figure of Merit in Bi-microwire Arrays, H. Iwasaki et al.

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Novel thermoelectric devices with nanoscopic scale are synthesized and physical properties of these devices are established by the Harman method. We have already succeeded in synthesis of submicron-size material of Bi₂Te₃ by chemical procedure and reported the enhancement of the figure of merit in Bi-microwire arrays. These obtained results are made a development to nanoscopic thermoelectricity in the present research. It is expected that high energy conversion efficiency is achieved by control of thermal conductivity in devices with nano-scale grains and by control of the crystal orientation and quantum effect in the nanowire arrays. Main themes are the establishment of the synthesis procedures and the physical properties in some devices which consist of the materials with nano scale particles and nanowires. On the basis of the obtained results, a practical application (ex. dehumidification system which has possibility of the successful application of nanoscopic thermoelectricity in Vietnam.) is tried that is suitable in the climate of Vietnam and is useful in Vietnam human life. This research is promoted by collaboration between JAIST and VNU. Optimization of thermoelectric module configuration, device size and form, and surface structure of the module are also examined in order to make high conversion efficiency. These examinations are quite important in the practical application.

The whole flow of this research is schematically summarized as follows,

