Defect Engineering for Control of Transport Properties

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Abstract

Tuning of transport properties of graphene is very important for various applications including transparent electrodes, heat dissipation, thermoelectric energy harvesting, and so on. Several research groups have reported that transport properties of graphene depend on defect density of graphene [1-4]. Now, it's time to design a strategy on defect engineering based on demands from application fields. Here, we are going to present our own data on the effect of the defect density on electrical/thermal conductivities and Seebeck coefficient of supported graphene and our measurement methods. And, we are going to discuss how to further enhance thermoelectric figure of merit based on the defect engineering.

References

[1] Kunpeng Jia, Yajuan Su, Yang Chen, Jun Luo, Jie Yang, Peng Lv, Zihan Zhang, Huilong Zhu, Chao Zhao, Tianchun Ye, Vacuum, Vol. 116 (2015) 90-95.
[2] Haidong Wang, Kosaku Kurata, Takanobu Fukunaga, Hiroshi Takamatsu, Xing Zhang, Tatsiya Ikuta, Koji Takahashi, Takashi Nishiyama, Hiroki Ago, Yasuyuki Takata, Sci. Rep., Vol. 6 (2016) 21823.
[3] Jinwoo Oh, Hoyeon Yoo, Jaeyoo Choi, Jeong Yun Kim, Dong Su Lee, Myung Jong Kim, Jong-Chan Lee, Woo Nyon Kim, Jeffrey C. Grossman, Jong Hyuk Park, Sang-Soo Lee, Heesuk Kim, Jeong Gon Son, Nano Energy, Vol. 35 (2017) 26-35.
[4] Yuki Anno, Yuki Imakita, Kuniharu Takei, Seiji Akita, Takayuki Arie, 2D Materials, Vol. 4 (2017) 025019.