



Associate Professor

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Background

- 2020– Associate Professor, Next Generation Tatara Co-Creation Centre, Shimane University
- 2019–2020 Project Researcher, Institute for Solid State Physics, University of Tokyo
- 2017–2019 Project Researcher, Dept. Physics, Osaka University
- 2016–2017 Assistant Professor, Dept. Mechanical Systems Engineering, Tokyo Metropolitan University
- 2012–2016 Assistant Professor, Dept. Materials Science and Technology, Tokyo University of Science
- 2010–2012 Project Researcher, Institute of Industrial Science, University of Tokyo
- 2009–2010 Research Fellow, Kanagawa Industrial Technology Center

Research

I have theoretically investigated polymer networks, thermoelectric semiconductors, and magnetic materials. The main theme running through most of my study is to understand physical properties (electronic states, carrier transport, mechanical properties, and so on) of materials from perspectives of microscopic or mesoscopic structures. Now I work to understand the mechanisms underlying the mechanical properties of alloys and amorphous metals by describing their microscopic structures as well as electronic states using first-principles calculations and molecular dynamics simulations.

Key papers

1. N. Hirayama, Y. Imai, and N. Hamada: "Conduction band engineering of Mg_2Si by isotropic strain for enhancement of thermoelectric performance: a first-principles study", *J. Appl. Phys.* 127, 205107-1 – 205107-11 (2020).
2. N. Hirayama, M. Ochi, and K. Kuroki : "Theoretical study of fluorine doping in layered LaOBiS_2 -type compounds", *Phys. Rev. B* 100, 125201-1 – 125201-8 (2019).
3. N. Hirayama, T. Iida, M. Sakamoto, K. Nishio, and N. Hamada : "Substitutional and interstitial impurity p-type doping of thermoelectric Mg_2Si : a theoretical study", *Sci. Tech. Adv. Mater.* 20, 160 – 172 (2019).
4. N. Hirayama and K. Tsurusaki : "Topological interaction between loop structures in polymer networks and the nonlinear rubber elasticity", *J. Soc. Rheol. Jpn.* 39, 65 – 73 (2011).