

Energy Conversion and Energy Storage

R&D Project Title: Emergence of highly efficient topological thermoelectric materials by high-throughput properties screening

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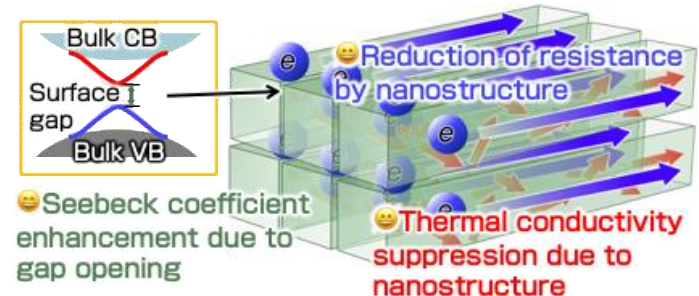
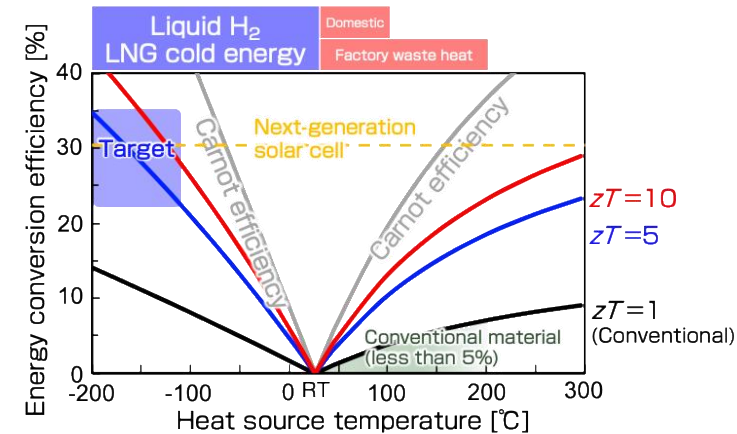
R&D Team: Saitama University



Summary :

By utilizing the properties of topological insulators to separate heat and electrical transports, it is possible to overcome the trilemma of improving thermoelectric performance, which has been difficult with conventional thermoelectric energy conversion materials. In order to immediately demonstrate the novel principle of topological thermoelectric materials, a material development system that dramatically shortens the research and development cycle will be achieved. In this study, we will establish an innovative material search system that highly integrates three elemental technologies: (1) theoretical search of topological thermoelectric materials, (2) combinatorial synthesis method, and (3) rapid thermoelectric property evaluation. The developed system will shorten the research and development cycle of highly efficient thermoelectric materials by a million times and immediately find candidates for topological thermoelectric materials that can achieve an energy conversion efficiency of 30%.

We will contribute to carbon neutrality through the development of highly efficient thermoelectric materials with an energy conversion efficiency of 30%.



Highly efficient cold energy recovery using topological thermoelectric materials