異方性磁気ペルチェ効果による吸発熱応答の機械的スイッチング

Mechanical cooling-heating switching of anisotropic magneto-Peltier effect

物材機構[1], 東大物工[2], 阪大産研[3], 阪大 CSRN[4], 東北大 CSRN[5], 東北大金研[6],
○平井 孝昌[1], セペリアミン ホセイン[1], 長谷川 顕登[2,3], 小山 知弘[3,4], 井口 亮[1],
大久保 忠勝[1], 千葉 大地[3,4], 内田 健一[1,5,6]

NIMS[1], The Univ. of Tokyo[2], SANKEN, Osaka Univ.[3], CSRN, Osaka Univ.[4], CSRN, Tohoku Univ.[5], IMR, Tohoku Univ.[6]
○Takamasa Hirai[1], Hossein Sepehri-Amin[1], Kento Hasegawa[2,3], Tomohiro Koyama[3,4], Ryo Iguchi[1],
Tadakatsu Ohkubo[1], Daichi Chiba[3,4], and Ken-ichi Uchida[1,5,6], E-mail:HIRAI.Takamasa@nims.go.jp

The development of spin caloritronics opened up a new area of the thermal energy conversion, where the spin degree of freedom provides unique functionalities for thermoelectric/thermospin conversion which cannot be realized if only the conventional Seebeck and Peltier effects are used [1]. Towards future sustainable green information technologies, it is crucial to establish active heat control principles and improve the thermoelectric/thermospin conversion efficiency. In this presentation, we mainly talk about the demonstration of the active switching of local cooling and heating generated by the anisotropic magneto-Peltier effect (AMPE) [2], one of the thermoelectric effects in magnetic materials, by applying a uniaxial tensile strain to a Ni film (Fig. 1(a)) [3]. We will also show our recent progress of the study on the enhancement of the anisotropic magneto-Seebeck effect, the Onsager reciprocal of AMPE, by doping of Ni with Pt having the strong spin-orbit interaction (Fig. 1(b)) [4].

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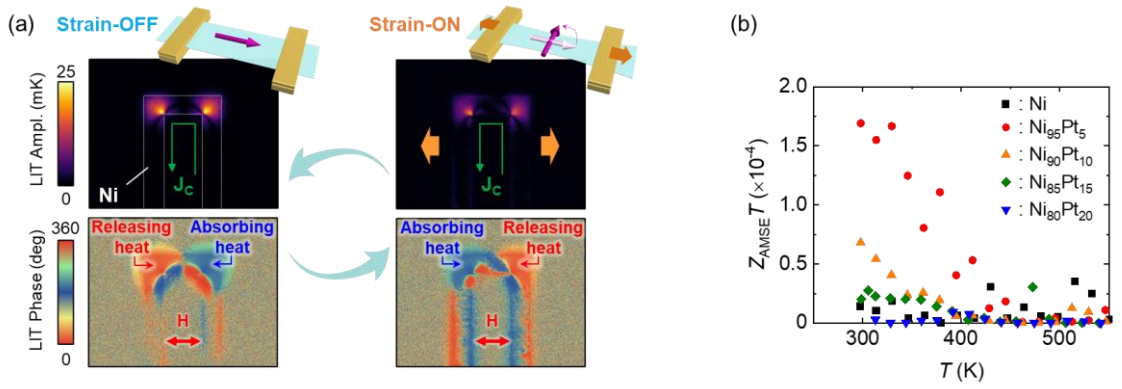

Fig. 1. (a) Demonstration of uniaxial-strain-induced cooling-heating switching of the AMPE in the Ni film by means of lock-in thermography (LIT) method. **H** and $\mathbf{J_C}$ denote the magnetic field and charge current, respectively. (b) Temperature dependence of dimensionless figure of merit for the thermoelectric conversion based on the anisotropic magneto-Seebeck effect for the Ni and NiPt alloys.