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**Spin Torque Oscillators with Highly Spin-Polarized Heusler Alloy**

TAKESHI SEKI, TATSUYA YAMAMOTO, KOKI TAKANASHI, Institute for Materials Research, Tohoku University — An intriguing spin torque device is the spin torque oscillator (STO). An important issue for STOs from the viewpoint of practical use is to enhance the rf output power ( $P_{out}$ ). Since  $P_{out}$  is roughly proportional to the square of the magnetoresistance (MR) ratio, a ferromagnetic material showing a large MR effect is a candidate for high-performance STO. In this study, we have developed high-power all-metal STOs with a full Heusler  $\text{Co}_2\text{Fe}_{0.4}\text{Mn}_{0.6}\text{Si}$  (CFMS) showing a large MR effect. The present STOs consist of current-perpendicular-to-plane (CPP) giant magnetoresistance (GMR) stacks of CFMS | Ag | CFMS. A pillar-shaped STO showed clear auto-oscillation. The large  $P_{out}$  of 23.7 nW was obtained owing to its out-of-plane magnetization precession. Simultaneously, the oscillation linewidth showed the minimum value of 10 MHz. On the other hand, a point-contact-type STO showed auto-oscillation even at zero external magnetic field, and the oscillation mode was drastically changed as the bias current was increased. The large  $P_{out}$  for both STOs indicates the CPP-GMR devices with CFMS layers are promising for high performance STO.

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