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ANTIFERROMAGNETIC SPIN HALL NANO-OSCILLATORS AS THZ-FREQUENCY SIGNAL SOURCES

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Abstract

We theoretically analyze and compare performance of THz-frequency signal sources based on an antiferromagnet (AFM)/Pt spin Hall nano-oscillators (SHNOs), which utilize different mechanisms of ac power extraction from the AFM layer: via the magnetic dipole emission mechanism from an SHNO coupled to a high-Q resonator and via the THz-frequency variations of the tunneling anisotropic magnetoresistance (TAMR) of antiferromagnetic tunnel junction (ATJ). We show that for a typical hematite/Pt SHNO the magnetic dipole emission mechanism could be preferable and could provide output ac power about several microwatts in the frequency range 0.5–1 THz. In contrast, ac signal extraction via the TAMR oscillations in an ATJ-based SHNO consisting of IrMn AFM layer could be easily experimentally realized at micro- and nano-scale, while the typical output ac power of such a source is about nW or less. However, we believe that this power could be increased up to several microwatts for an ATJ-based SHNO with optimized parameters.

Type of Book of Abstracts

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