

Abstract Submitted  
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**Spin Hall effects in CuAu-I-type metallic antiferromagnets<sup>1</sup>** WEI ZHANG, BENJAMIN JUNGFLAISCH, WANJUN JIANG, JOHN PEARSON, AXEL HOFFMANN, Argonne National Laboratory, FRANK FREIMUTH, YURIY MOKROUSOV, Forschungszentrum Julich — We investigated the spin Hall effect of CuAu-I-type metallic antiferromagnets by using spin pumping – inverse spin Hall effect via a coplanar waveguide ferromagnetic resonance broadband technique. By studying the ratio of the two voltage components (anisotropic magnetoresistance and inverse spin Hall effect) with the metal layer thickness, the spin diffusion lengths of the materials are directly extracted, which further allows the determination of the spin Hall angle. We performed such analysis for polycrystalline FeMn, PdMn, IrMn, and PtMn. In particular, PtMn showed large spin Hall effect that is comparable to Pt. First principle calculations of the intrinsic spin Hall effect reproduce these results. We also demonstrate the epitaxial growth of these metallic crystals and its influence to the spin Hall effects due to different crystalline orientation. This work highlights the importance of both spin-orbit coupling and the magnetic ordering to the spin Hall effects of metals. W. Zhang, *et al.*, Phys. Rev. Lett. **113**, 196602 (2014)

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