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Nanowire spin Hall oscillators: width dependence ANDREW SMITH, Univ of California - Irvine, TOBIAS SCHNEIDER, Helmholtz-Zentrum Dresden - Rossendorf, Institute of Ion Beam Physics and Materials Research, Bautzner Landstrae 400, 01328 Dresden, German, LIU YANG, ILYA KRIVOROTOV, Univ of California - Irvine — We present experimental studies of auto-oscillatory magnetization dynamics in nanowire spin Hall oscillators (SHOs) as a function of the wire width ranging from 0.17 m to 2 m. These SHOs consist of long Pt(7 nm)/Py(5 nm)/AlOx(2 nm) wires on a sapphire substrate. Direct current generating anti-damping spin torque is applied to a section of the wire between two leads separated by a 2 m gap, which defines the SHO active region.[1] All devices show onset of auto-oscillations at similar critical current densities. For the 0.17 m and 0.34 m wide nanowire SHOs, auto-oscillatory modes arising from the bulk and edge eigenmodes of the nanowire are clearly seen in the emission spectra. For SHO devices based on wider wires, the bulk auto-oscillatory modes dominate the emission spectrum due to the larger wire volume occupied by the bulk modes. Our work demonstrates robust operation of nanowire-based SHOs over a wide range of nanowire widths and presents an example of a spin torque oscillator with the active area extended into the m^2 domain. [1] Zheng Duan et al, Nature Communications 5, 5616 (2014)

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