Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Lorenz number of conducting PEDOT:PSS[1] XIAOJIA WANG, Department of Materials Science and Engineering, and Materials Research Laboratory, University of Illinois, Urbana-Champaign, NELSON COATES, Molecular Foundry, Lawrence Berkeley National Laboratory, Berkeley, California, RACHEL SEGALMAN, Department of Chemical and Biomolecular Engineering, University of California, Berkeley, Berkeley, California, DAVID CAHILL, Department of Materials Science and Engineering, and Materials Research Laboratory, University of Illinois, Urbana-Champaign — The electronic thermal conductivity is related to the electrical conductivity through the Wiedemann-Franz law (WFL), which predicts that the ratio of the electronic thermal conductivity to the electrical conductivity is proportional to the absolute temperature. The WFL has been validated for various materials; however, deviations may arise under certain circumstances, in which the relaxation times for the electrical and thermal processes are not identical. In this work, we investigate the Lorenz number, the proportionality factor in the WFL, of conjugated polymers. We prepare samples made of poly(3,4-ethylenedioxythiophene):poly(styrenesulfonate) (PEDOT:PSS) with tunable electrical conductivity. The in-plane electrical resistivity is characterized with setups of both 4-point probe and Van der Pauw configurations. To determine the thermal conductivity along the same direction as that for the electrical resistivity, we measure the through-plane thermal conductivity of the cross section of PEDOT:PSS using time-domain thermoreflectance. The effects of anisotropy and inhomogeneity on the thermal conductivity of PEDOT:PSS are also examined.

[1]This work is supported by AFOSR MURI FA9550-12-1-0002

Xiaojia Wang
Department of Materials Science and Engineering, and
Materials Research Laboratory, University of Illinois

Date submitted: 15 Nov 2013 Electronic form version 1.4