

Abstract Submitted  
for the MAR16 Meeting of  
The American Physical Society

**Enhanced charge transport in highly conducting PEDOT-PSS films after acid treatment** V. AKSHAYA SHIVA, RAVI BHATIA, REGHU MENON, Indian Inst of Science — The high electrical conductivity, good stability, high strength, flexibility and good transparency of poly(3,4-ethylenedioxythiophene)-poly(styrenesulfonate) (PEDOT-PSS), make it useful for many applications including polymeric anodes for organic photovoltaics, light-emitting diodes, flexible electrodes, supercapacitors, electrochromic devices, field-effect transistors and antistatic-coatings. However, the electrical conductivity of PEDOT-PSS has to be increased significantly for replacement of indium tin oxide (ITO) as the transparent electrode in optoelectronic devices. The as prepared (pristine) PEDOT-PSS film prepared from the PEDOT-PSS aqueous solution usually has conductivity below  $1\text{Scm}^{-1}$ , remarkably lower than ITO. Significant conductivity enhancement has been observed on transparent and conductive PEDOT-PSS films after a treatment with inorganic acids. Our study investigates the charge transport in pristine and  $\text{H}_2\text{SO}_4$ ,  $\text{HNO}_3$ ,  $\text{HCl}$  treated PEDOT-PSS films. We have treated the films with various concentrations of acids to probe the effect of the acid treatment on the conduction mechanism. The study includes the measurement of dc and electric field dependent conductivity of films in the temperature range of 4.2K-300K. We have also performed magneto-resistance measurements in the range of 0-5T. An enhancement by a factor of  $\sim 10^3$  has been observed in the room temperature conductivity. The detailed magneto-transport studies explain the various mechanisms for the conductivity enhancement observed.

V. Akshaya Shiva  
Indian Inst of Science

Date submitted: 06 Nov 2015

Electronic form version 1.4