



## Department of Materials Science and Engineering Seminar Series 2023

# PEDOT:PSS WITH HIGH THERMOELECTRIC PERFORMANCE THROUGH ENERGY FILTERING

Li Chang'an

16 November 2023, Thursday at 2.00 PM

Venue: Join Zoom Meeting

<https://nus-sg.zoom.us/j/88976090387?pwd=dmFXSFNZM3JvYmViVm8vYU9sTUtvQT09>

### Abstract

As society and the economy progress, the demand for renewable energy sources is on the rise. Thermoelectric materials have garnered significant attention for their ability to directly convert abundant waste heat into electrical energy. Among these materials, poly(3,4-ethylenedioxy-thiophene): poly(styrenesulfonate) (PEDOT:PSS) stands out as a promising candidate for future energy harvesting applications. However, PEDOT:PSS faces challenges such as low conductivity (less than  $1 \text{ S cm}^{-1}$ ) and a Seebeck coefficient that is roughly an order of magnitude lower than inorganic counterparts, resulting in a lower ZT value. Given the interdependence of Seebeck coefficient and conductivity, treatments, especially energy filtering, are necessary to enhance the Seebeck coefficient without significantly affecting electrical conductivity. Therefore, the primary goal of this thesis is to develop highly conductive PEDOT:PSS with a high Seebeck coefficient, achieved through the application of the energy filtering method. This will be explored through approaches involving inorganic ferroelectric nanoparticle composites, treatment with zwitterion molecules, and post-treatment with aromatic compounds.

## **Biography**

Li Chang'an received his B.Sc. degree from the Southern University of Science and Technology in 2019. He is currently a joint Ph.D. student in the MSE department at the National University of Singapore under the supervision of Associate Professor Ouyang Jianyong. Additionally, he is co-supervised by Associate Professor Aung Ko Ko KYAW at the Southern University of Science and Technology. His current research aims to develop thermoelectrics based on PEDOT:PSS with high electrical conductivity and Seebeck coefficient.

**Please join us!**

HOST: Prof. Ding Jun