Plumeria Blooms for Organic Electronics!

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Semiconducting polymers opened up new avenues in electronics device technology and with advantages such as economic feasibility, low temperature processing, large area and roll to roll print—fabrication possibilities. Organic electronics revolutionized the consumer electronics market with OLED displays while printable plastic solar cells are inching towards commercial viability holding out hopes to the energy starving planet that has been bruised by deadly emission rates. However, organic semiconductors are currently expensive and are plagued with environmental sustainability issues characteristic to all synthetic polymers. Thus, this technology demands green and cost effective semiconducting polymeric alternatives. This is the objective of the project wherein a natural polymeric semiconductor was developed from the latex of Plumeria, and its application demonstrated. Fresh Plumeria latex was coagulated with acetic acid and the dried extract was dissolved in appropriate organic solvents and subsequently doped with iodine at various molar ratios. The spin coated films were investigated for structural, optical and electrical properties. Electrical conductivity showed an increase by more than 10 orders to semiconducting range. Band gap, and HOMO//LUMO of the doped material were also evaluated. An effort was also made to understand, and explain the conduction mechanism involved. The application potential of this new green semiconductor was demonstrated by fabricating an Organic Field Effect Transistor (OFET) with it as the channel layer. The results revealed the Plumeria latex’s hitherto unknown potential in the field of organic electronics.

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