

## Optical and electrochemical behavior of indanedione based small molecule for organic solar cells

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This work reports a new donor- $\pi$ -acceptor (D- $\pi$ -A, HBT-TID) type small organic molecule containing thiophene as  $\pi$  spacer, linked with electron deficient indanedione as an acceptor and electron rich hexylbithiophene as donor unit. The synthesized HBT-TID molecule presented good absorption properties by displaying the maximum absorption at  $\sim 515$  nm in chloroform solution and band gap of  $\sim 2.07$  eV was estimated using the onset value of maximum absorption. The solubility of synthesized HBT-TID molecule was excellent in common solvents which might be associated to the presence of hexylbithiophene unit. The synthesized HBT-TID chromophore showed reasonably suitable highest occupied molecular orbital (HOMO) and lowest unoccupied molecular orbital (LUMO) energy level values, which would scale up charge transportation behavior from donor to acceptor units. The synthesized HBT-TID chromophore could be a potential donor material in fabricating the solution processed bulk heterojunction organic solar cells.