Optical and electrochemical behavior of Octyloxy Benzene based Small Organic molecule for solar cells

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This work reports a novel acceptor-donor acceptor (A-D-A, OBTID) type small organic molecule which comprises of octyloxy benzene unit as donor and two thiophene indanedione units as acceptor units. The synthesized OBTID chromophore exhibited good absorption behavior by observing the maximum absorbance at 472 nm and posed a band gap of ~ 2.07 eV using the onset absorption value at ~ 600 nm. The introduction of octyloxy group in OBTID significantly improved the solubility of molecules in all common organic solvents. By analyzing the cyclicvoltamtery (CV), the synthesized OBTID chromophore showed reasonably suitable highest occupied molecular orbital (HOMO) and lowest unoccupied molecular orbital (LUMO) energy level values, which were good matched with the HOMO value of PC61BM acceptor. The synthesized OBTID chromophore would be applied as donor materials in organic solar cells and evaluated all photovoltaic properties by measuring current-voltage characterizations under 1 sun condition.