

Functionalization of Endohedral Metallofullerene  
 $\text{Lu}_3\text{N@C}_{80}$  with Organic Electron Acceptor

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Fullerenes  $\text{C}_{60}$  and  $\text{C}_{70}$  have been widely used as electron acceptors for construction of various photosynthesis and photovoltaic systems, owing to their favorable reduction potentials and small reorganization energies in photo-induced reactions. However, the electron-donating properties of  $\text{C}_{60}$  and  $\text{C}_{70}$  are very poor because of their high oxidation potentials. Previous studies revealed that the photo-induced electron donation of  $\text{C}_{60}$  is unfavorable unless very strong electron acceptors or scandium ions are employed. Such limitation might impede using  $\text{C}_{60}$  as a widely applicable electron donor.

$\text{Lu}_3\text{N@C}_{80}$  is one of well studied endohedral metallofullerenes. Its first oxidation potential is c.a. 600 mV lower than that of  $\text{C}_{60}$ , suggesting its better electron-donating property as compared with  $\text{C}_{60}$  or its derivatives. The present work is focusing on developing a synthetic way toward novel conjugates composed of  $\text{Lu}_3\text{N@C}_{80}$  and organic electron acceptor. The structures, redox properties and photophysical properties of these conjugates have been fully characterized. Importantly, the electron-donating property of  $\text{Lu}_3\text{N@C}_{80}$  has been experimentally confirmed and the related geometry effect is discussed as well.