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Synthesis of new donor–acceptor–donor materials via Au-catalyzed double cascade cyclization

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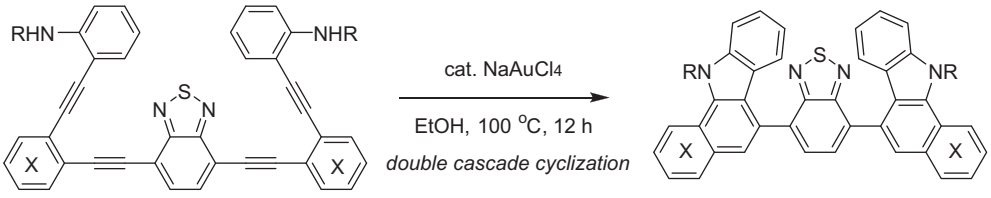
ABSTRACT

A new class of symmetric π-conjugated donor–acceptor–donor (D–A–D) materials, with aryl- or heteroaryl[*a*]annulated carbazole (AHA[*a*]C) moieties as the donors and with 2,1,3-benzothiadiazole (BT) as an acceptor, has been synthesized via $NaAuCl_4$-catalyzed double cascade cyclization of arenyl tetraynes in ethanol in good to high yields. Photophysical and electrochemical properties of the new D–A–D materials were investigated.

Conjugated donor–acceptor–donor (D–A–D) organic semiconductors have attracted increasing interest due to their various applications in optoelectronic devices such as organic light emitting diodes (OLEDs),[1] organic photovoltaic devices (OPVs),[2] and organic thin film transistors (OTFTs).[3] Carbazole-based conjugated polymers and small molecules have been studied extensively for optoelectronic device applications because of the good hole-transporting ability of the carbazole moiety which results from its electron-donating ability.[4] In addition, materials with 2,1,3-benzothiadiazole (BT) as an acceptor are reported to reduce the HOMO–LUMO band gaps as well as to expand the emission absorption.[5] A key characteristic of the D–A–D materials is their tunable optical and electrochemical properties by appropriate chemical modification of the structures of the donors and acceptors, which controls the HOMO–LUMO energy levels or band gaps associated with intramolecular donor–acceptor interactions.[1–3] The design



(1)

3: X = C (benzene), S (thiophene, benzothiophene)

4: D-A- Dmaterials

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