Silicon/Boron Exchange Routes to Conjugated Organoboron Polymers

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π-Conjugated organoboron polymers are currently attracting considerable attention as the incorporation of the vacant p orbital of trivalent boron into the backbone of conjugated polymers leads to materials with intriguing optical and electronic properties. This has enabled applications in organic electronic and optoelectronic devices (OLEDs, OFETs, photovoltaic cells), for biomedical imaging, and as selective chemosensors for certain anions or biologically relevant amines.[1] We have developed a general, environmentally benign catalytic route to donor–acceptor type organoborane molecules and polymers such as **1a,b** (Figure 1).[2] The method uses organosilicon substrates in combination with dibromoboranes and electrophilic trimethylsilyl reagents as the catalysts.

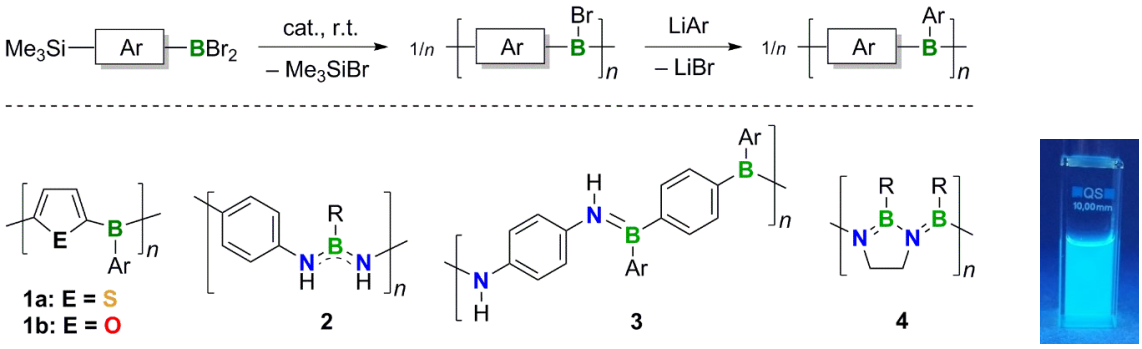

Figure 1. Top: Catalytic Si/B exchange route to conjugated organoborane polymers. Bottom: Organoborane polymers **1a,b** and BCN hybrid polymers **2–4**. Right: Fluorescence of **1b**.

Furthermore, a series of inorganic–organic hybrid polymers, **2** – **4**, with unsaturated B=N units in the main chain will be presented.[3,4] This includes a BN analogue of poly(*p*-phenylene vinylene) (PPV, **3**)[3b] and the first examples of poly(iminoborane)s (**4**), which are inorganic main group polymers that have been previously elusive.[4]

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[2] A. Lik, L. Fritze, L. Müller, H. Helten, *J. Am. Chem. Soc.* **2017**, *139*, 5692-5695.
[3] (a) T. Lorenz, A. Lik, F. A. Plamper, H. Helten, *Angew. Chem. Int. Ed.* **2016**, *55*, 7236-7241; (b) T. Lorenz, M. Crumbach, T. Eckert, A. Lik, H. Helten, *Angew. Chem. Int. Ed.* **2017**, *56*, 2780-2784; (c) H. Helten, *Chem. Eur. J.* **2016**, *22*, 12972-12982.
[4] (a) O. Ayhan, T. Eckert, F. A. Plamper, H. Helten, *Angew. Chem. Int. Ed.* **2016**, *55*, 13321-13325; (b) O. Ayhan, N. A. Riensch, C. Glasmacher, H. Helten, *Chem. Eur. J.* **2018**, DOI: 10.1002/chem.201705913.