

## Boron-Nitride-Carbon Organogels

J. Dosso,<sup>[a,b]</sup> **H. Oubaha**,<sup>[c]</sup> F. Fasano,<sup>[a]</sup> G. Torres Llerena,<sup>[c]</sup> S. Melinte,<sup>[c]</sup> J-F. Gohy,<sup>[d]</sup> C. Hughes,<sup>[a]</sup> K. D. M. Harris,<sup>[a]</sup> N. Demitri,<sup>[e]</sup> M. Abrami,<sup>[f]</sup> M. Grassi<sup>[f]</sup>, and D. Bonifazi<sup>[a,g]</sup>

<sup>[a]</sup> School of Chemistry, Cardiff University, Park Place, Cardiff CF10 3AT, UK

<sup>[b]</sup> Department of Chemical and Pharmaceutical Sciences, Centre of Excellence for Nanostructured Materials, University of Trieste, 34127 Trieste, Italy

<sup>[c]</sup> Institute of Information and Communication Technologies, Electronics and Applied Mathematics, Université catholique de Louvain, 1348 Louvain-la-Neuve, Belgium

<sup>[d]</sup> Institute of Condensed Matter and Nanosciences, Université catholique de Louvain, 1348 Louvain-la-Neuve, Belgium

<sup>[e]</sup> Elettra – Sincrotrone Trieste, Area Science Park, 34149 Trieste, Italy

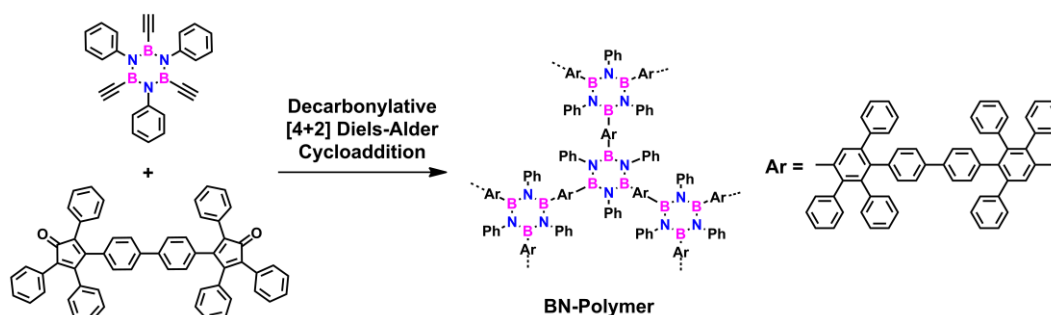
<sup>[f]</sup> Department of Industrial Engineering and Information Technology, University of Trieste, 34127 Trieste, Italy

<sup>[g]</sup> Institute of Organic Chemistry, University of Vienna, 1090 Vienna, Austria

E-mail : [hamid.oubaha@uclouvain.be](mailto:hamid.oubaha@uclouvain.be)

### Abstract:

Heteroatom-doping or peripheral addition of functional groups are the major strategies used to enrich the chemical and physical properties of the polyphenylene-based frameworks.<sup>1-4</sup> In this work, we describe the synthesis of the first BN-doped polyphenylenic material obtained through a decarbonylative [4 + 2] Diels-Alder cyclo-addition reaction between a *tri*-ethynylborazine unit and a *bis*-cyclopentadienone derivative. The BN-polymer was extensively characterized by FT-IR, solid-state <sup>13</sup>C- and <sup>11</sup>B-NMR and by comparison with the isolated monomeric unit. Given the unique thermal and chemical properties, the material was studied as potential support for solid state electrolytes, thus presenting great potential for the application of this new class of materials in lithium-ion batteries.



(1) Bonifazi, D.; Fasano, F.; Lorenzo-Garcia, M. M.; Marinelli, D.; Oubaha, H.; Tasseroul, J. *Chem. Commun.* **2015**, 51, 15222.

(2) Helten, H. *Chem.: - Eur. J.* **2016**, 22, 12972.

(3) John, H.; Bauer, R.; Espindola, P.; Sonar, P.; Heinze, J.; Müllen, K. *Angew. Chem. Int. Ed.* **2005**, 44, 2447.

(4) Marinelli, D.; Fasano, F.; Najjari, B.; Demitri, N.; Bonifazi, D. *J. Am. Chem. Soc.* **2017**, 139, 5503.