

## Blue emitting organic semiconductors under high pressure - DTU Orbit (09/11/2017)

### Blue emitting organic semiconductors under high pressure: status and outlook

This review describes essential optical and emerging structural experiments that use high GPa range hydrostatic pressure to probe physical phenomena in blue-emitting organic semiconductors including  $\pi$ -conjugated polyfluorene and related compounds. The work emphasizes molecular structure and intermolecular self-organization that typically determine transport and optical emission in  $\pi$ -conjugated oligomers and polymers. In this context, hydrostatic pressure through diamond anvil cells has proven to be an elegant tool to control structure and interactions without chemical intervention. This has been highlighted by high pressure optical spectroscopy whilst analogous x-ray diffraction experiments remain less frequent. By focusing on a class of blue-emitting  $\pi$ -conjugated polymers, polyfluorenes, this article reviews optical spectroscopic studies under hydrostatic pressure, addressing the impact of molecular and intermolecular interactions on optical excitations, electron-phonon interaction, and changes in backbone conformations. This picture is connected to the optical high pressure studies of other  $\pi$ -conjugated systems and emerging x-ray scattering experiments from polyfluorenes which provides a structure-property map of pressure-driven intra- and interchain interactions. Key obstacles to obtain further advances are identified and experimental methods to resolve them are suggested.

### General information

State: Published

Organisations: Department of Physics, Neutrons and X-rays for Materials Physics, University of Missouri

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Number of pages: 33

Publication date: 2016

Main Research Area: Technical/natural sciences

### Publication information

Journal: Reports on Progress in Physics

Volume: 79

Issue number: 6

Article number: 066601

ISSN (Print): 0034-4885

Ratings:

BFI (2017): BFI-level 2

Web of Science (2017): Indexed Yes

BFI (2016): BFI-level 2

Scopus rating (2016): CiteScore 12.39 SJR 6.125 SNIP 5.017

Web of Science (2016): Indexed yes

BFI (2015): BFI-level 2

Scopus rating (2015): SJR 7.289 SNIP 5.081 CiteScore 12.65

Web of Science (2015): Indexed yes

BFI (2014): BFI-level 2

Scopus rating (2014): SJR 8.61 SNIP 5.232 CiteScore 13.01

BFI (2013): BFI-level 2

Scopus rating (2013): SJR 8.919 SNIP 4.308 CiteScore 11.31

ISI indexed (2013): ISI indexed yes

Web of Science (2013): Indexed yes

BFI (2012): BFI-level 2

Scopus rating (2012): SJR 8.87 SNIP 5.448 CiteScore 12.14

ISI indexed (2012): ISI indexed yes

Web of Science (2012): Indexed yes

BFI (2011): BFI-level 2

Scopus rating (2011): SJR 9.01 SNIP 7.296 CiteScore 14.29

ISI indexed (2011): ISI indexed yes

Web of Science (2011): Indexed yes

BFI (2010): BFI-level 2

Scopus rating (2010): SJR 8.401 SNIP 6.778

BFI (2009): BFI-level 2

Scopus rating (2009): SJR 7.626 SNIP 6.688

BFI (2008): BFI-level 2

Scopus rating (2008): SJR 7.823 SNIP 7.357

Scopus rating (2007): SJR 7.583 SNIP 6.107

Scopus rating (2006): SJR 6.293 SNIP 5.131

Scopus rating (2005): SJR 6.053 SNIP 5.428

Scopus rating (2004): SJR 5.548 SNIP 4.86

Scopus rating (2003): SJR 5.365 SNIP 4.497

Scopus rating (2002): SJR 6.523 SNIP 5.221

Scopus rating (2001): SJR 8.011 SNIP 5.999

Scopus rating (2000): SJR 7.622 SNIP 4.771

Scopus rating (1999): SJR 8.173 SNIP 5.167

Original language: English

High pressure, Conjugated polymers, Polyfluorene

DOIs:

10.1088/0034-4885/79/6/066601

Source: FindIt

Source-ID: 277494798

Publication: Research - peer-review › Journal article – Annual report year: 2016