

Technical University of Denmark



A Versatile Toolbox for Preparation of Functional Conductive Polymers

Daugaard, Anders Egede; Lind, Johan Ulrik; Hansen, Thomas Steen; Larsen, Niels Bent; Hvilsted, Søren

Publication date:
2012

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):
Daugaard, A. E., Lind, J. U., Hansen, T. S., Larsen, N. B., & Hvilsted, S. (2012). A Versatile Toolbox for Preparation of Functional Conductive Polymers. Abstract from 49th Nordic Polymer Days 2012, Copenhagen, Denmark.

DTU Library
Technical Information Center of Denmark

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

A Versatile Toolbox for Preparation of Functional Conductive Polymers

*Anders E. Daugaard*¹, *Johan Ulrik Lind*², *Thomas Steen Hansen*², *Niels B. Larsen*², *Søren Hvilsted*¹
¹*Danish Polymer Centre, Department of Chemical and Biochemical Engineering, Technical University of Denmark, 2800 Kgs. Lyngby, Denmark (adt@kt.dtu.dk)*
²*Department of Micro- and Nanotechnology, Technical University of Denmark, DTU Nanotech, 2800 Kgs. Lyngby, Denmark*

Conductive polymers have been studied extensively during recent years. In order to broaden the application field of conductive polymers we have developed an azide functional poly(3,4-ethylenedioxythiophene) (PEDOT-N₃)(1). The azide functional conductive polymer can be postpolymerization functionalized to introduce a large number of functionalities through click chemistry(2–4).

Through selection of reaction conditions it is possible control the depth of the reaction into the polymer film to the upper surface or the entire film(5). Thus a conductive polymer can be prepared with a subsurface layer of highly conductive polymer where only the upper surface has been grafted with functional groups to ensure selectivity of the surface layer for e.g. interaction with specific biospecies. The conductive polymer can be patterned using selective etching, which enables preparation of e.g. interdigitated electrodes or other surface structures. The electrodes have been applied in controlled localized click reactions through "electroclick" reactions(6). This enables preparation of both highly functional electrodes as well as gradient surfaces(7). The system is very versatile in all dimensions and structures and allows for preparation of conductive polymers with very specific properties.

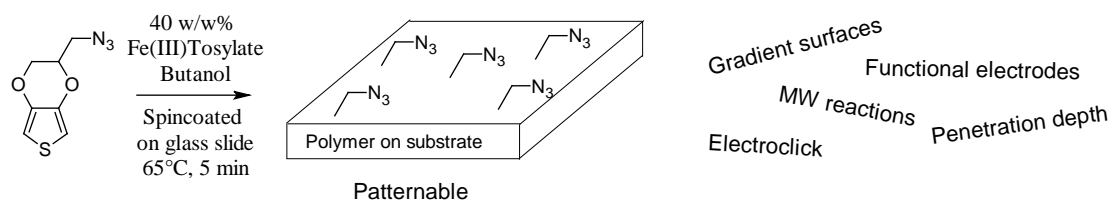


Figure 1: Preparation of functional conductive polymers and the versatility of the system.

References

- (1) Daugaard, A.; Hansen, T.; Larsen, N.B.; Hvilsted, S. *Macromolecules* **2008**, *2*, 4321-4327.
- (2) Binder, W. H.; Sachsenhofer, R. *Macrom. Rapid Comm.* **2008**, *29*, 952-981.
- (3) Iha, R. K.; Wooley, K. L.; Nyström, A. M.; Burke, D. J.; Kade, M. J.; Hawker, C. J. *Chem. Rev.* **2009**, *109*, 5620-86.
- (4) Meldal, M.; Tornøe, C. W. *Chemical reviews.* **2008**, *108*, 2952-3015.
- (5) Lind, J. U.; Hansen, T. S.; Daugaard, A. E.; Hvilsted, S.; Andresen, T. L.; Larsen, N. B. *Macromolecules.* **2011**, *44*, 495-501.
- (6) Hansen, T. S.; Daugaard, A. E.; Hvilsted, S.; Larsen, N. B. *Adv. Mater.* **2009**, *21*, 4483-4486.
- (7) Hansen, T. S.; Lind, J. U.; Daugaard, A. E.; Hvilsted, S.; Andresen, T. L.; Larsen, N. B. *Langmuir* **2010**, *26*, 16171-7.