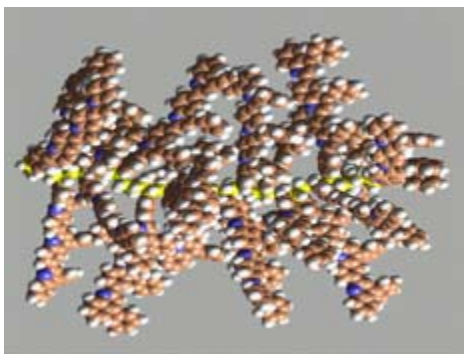


# Quinoline-Based Polymer Bottlebrushes and Oligomers

Jessica M. Hancock  
IGERT Fellow  
Department of Chemistry  
March 2005

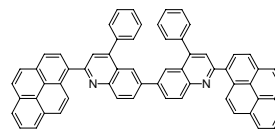
## Conjugated Polymer Bottlebrushes

- *Single-molecule nanostructures*
- *Nanoelectronics / nanophotonics*
- *Optoelectronic device applications*

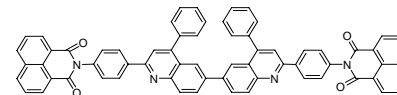


## Conjugated Oligomers

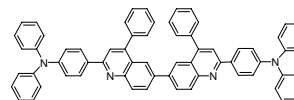
- *n-Type (electron transport) semiconductors*
- *Highly fluorescent materials*
- *Thermally robust (high  $T_g$ ,  $T_m$ )*
- *no  $\pi$ - $\pi$  stacking interactions (minimizes intermolecular species)*



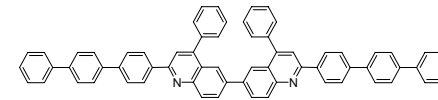
BPYPQ



BNIPQ



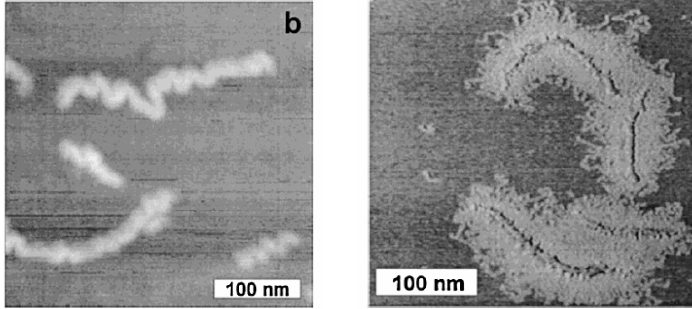
BTPAPQ



BTTPQ



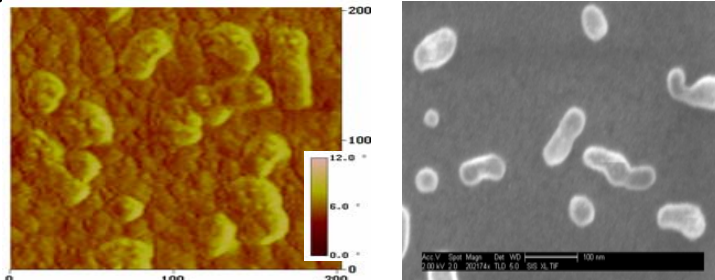
# Conjugated Polymer Bottlebrushes



➤ **PS/PMMA** and **PMMA/PnBuA** bottlebrushes form wormlike nanostructures

➤ **No photonic or electronic properties**

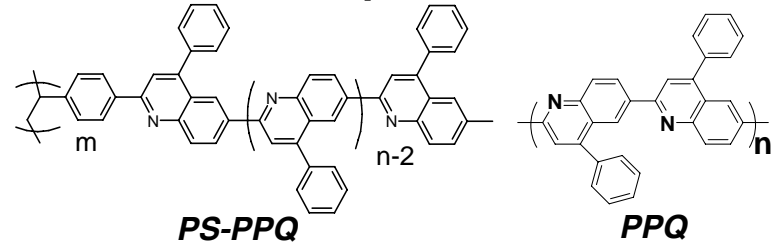
*Moller et al Chem. Rev. 2001, 101, 4099*



➤ **AFM and SEM images reveal cylindrical rodlike nanostructures that are ~65 nm in length and 18-20nm in diameter**

➤ **Can synthetically control size of nanostructure**

## Properties

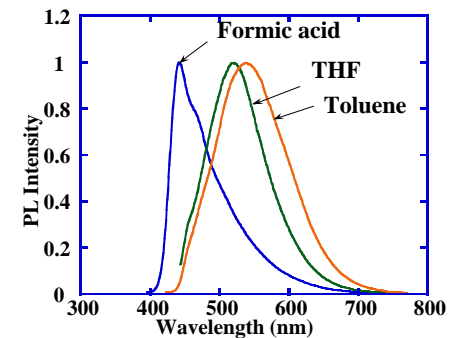
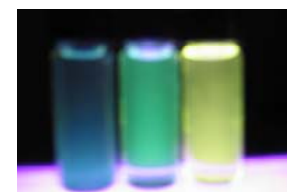


➤ **Enhanced Electroluminescence**

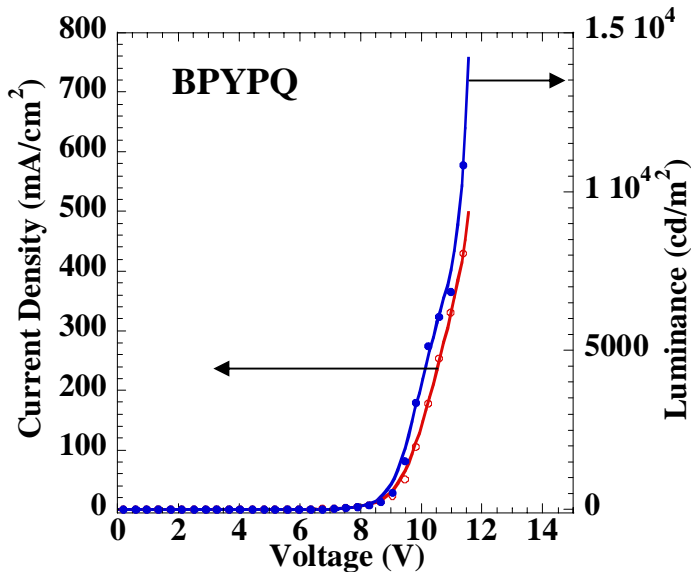
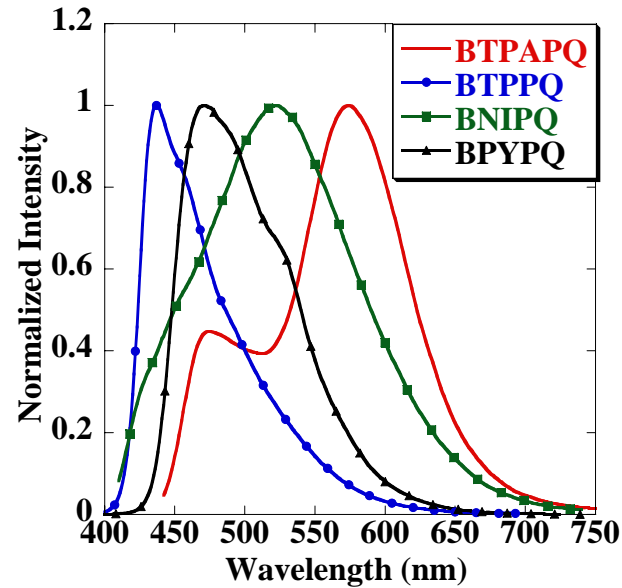
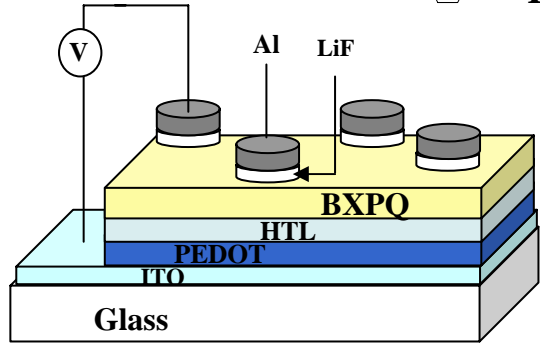
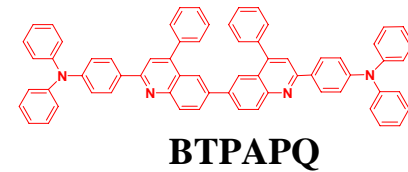
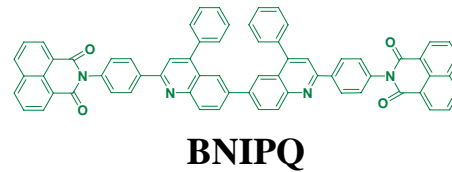
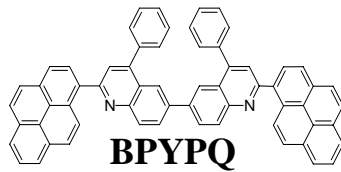
- **675 cd/m<sup>2</sup> (compared to 400cd/m<sup>2</sup>)**

➤  **$\pi$ -Stacking in solution**

- **Solvatochromism from blue to green to yellow**



# Conjugated Oligoquinolines



- **Highly emissive electron transport materials**
- **Brightness up to 14,200 cd/m<sup>2</sup> (2.8cd/A)**
- **EL emission ranging from 437 to 574nm**
- **Efficiency: 3.3 cd/A @ 5,230 cd/m<sup>2</sup>**

