

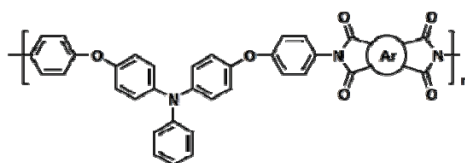
# Synthesis and Characterization of Novel Aromatic Polyimides with Enhanced Electrochromic Properties

Sheng-Huei Hsiao (蕭勝輝)

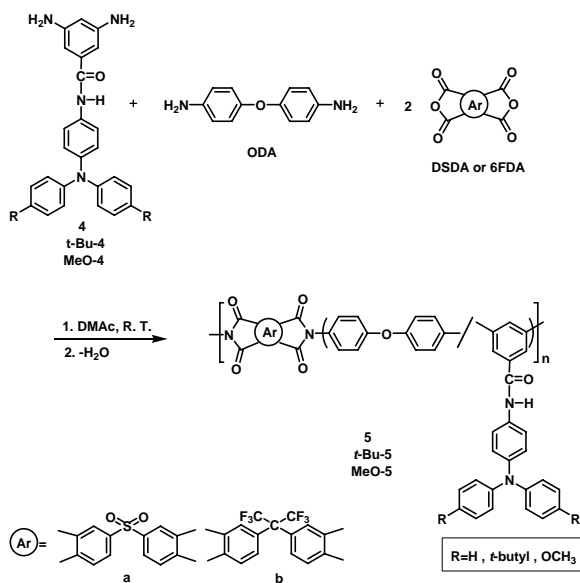
Department of Chemical Engineering and Biotechnology, National Taipei University of Technology  
(國立臺北科技大學化學工程與生物科技系)

E-mail: [shhsiao@ntut.edu.tw](mailto:shhsiao@ntut.edu.tw)

**Topic I:** A triphenylamine (TPA)-based bis(ether amine) monomer, 4,4'-bis(*p*-aminophenoxy)triphenylamine, was successfully synthesized and reacted with aromatic tetracarboxylic dianhydrides via a conventional two-step

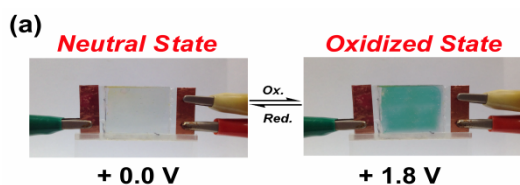


technique leading to a series of TPA-containing polyimides. These polyimides showed a high level of thermal stability, with glass-transition temperatures of 234-282 °C and decomposition temperatures in excess of 540 °C. They showed well-defined and reversible redox couples during both *p*- and *n*-doping processes, together with multi-electrochromic behaviors. They exhibited enhanced redox-stability and electrochromic performance as compared to the corresponding analogs without the phenoxy spacer between the TPA and imide units.



**Topic II:** Three new aromatic diamine monomers with pendent triphenylamine group including **4**, **t-Bu-4** and **MeO-4** were synthesized. Aromatic polyimides with pendent triphenylamine group were synthesized from equimolar mixture of 4,4'-oxydianiline (ODA) and each of the newly synthesized diamines with two tetracarboxylic dianhydrides (DSDA and 6FDA) via a conventional two-steps procedure. These polymers exhibited good solubility in polar organic solvents and could be solution-cast into tough and flexible polymer films. They showed excellent thermal stability, with  $T_g$  values in the range of 284-309 °C.

The polyimides exhibited reversible electrochemical oxidation, accompanied by strong color changes with high contrast ratio and electrochromic stability.



## References:

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3. H.-J. Yen, G.-S. Liou, *Polym. Chem.*, **2012**, *3*, 255.