

Supplementary Information for:

“Click” Polymerization on Self-assembled Monolayer: A Convenient Approach to Functionalize Various Surfaces with Polytriazole

Debasis Samanta,^{*a} P. Murugan,^a Soundaran Jeevarathinam Ananthakrishnan,^a Narayanasastri Somanathan,^a Sujoy K. Das,^c Sellamuthu Nagappan Jaisankar,^a Asit Baran Mandal^{*b}

^a Polymer Division, Council of Scientific and Industrial Research (CSIR)-Central Leather Research Institute (CLRI), Adyar, Chennai-600020, India. Fax: 91-44-24911589, Tel: 91 -44 24422059; E-mail: debasis@clri.res.in, debasis.samanta@gmail.com

^b Chemical Lab, Council of Scientific and Industrial Research (CSIR)-Central Leather Research Institute (CLRI), Adyar, Chennai-600020, India, Email: abmandal@clri.res.in

^c Environmental Technology Division, Council of Scientific and Industrial Research (CSIR)-Central Leather research Institute (CLRI), Adyar, Chennai-600020, India.

1. Materials

3-(chloropropyl)trimethoxysilane, sodium azide, Cu(I)I, diisopropylamine, N,N-dimethylformamide, 2,2'-dibromothiophene, 4,4'-oxydianiline was purchased from Aldrich. 3-Azidopropyltrimethoxysilane was prepared from 3-(chloropropyl)trimethoxysilane and sodium azide using literature procedure.¹ 2,5-diethynylthiophene (**1**) was freshly prepared from 2,2'-dibromothiophene using the method described by Wong and others.² 4,4'-oxibis(azidobenzene) was prepared from 4,4'-oxydianiline using the literature procedure³ and used immediately. *Escherichia coli* (MTCC 062) was obtained from the Institute of Microbial Technology, Chandigarh, India and maintained in nutrient agar slants.

2. Imaging and spectroscopy

Optical microscope images was acquired in Olympus BX50 microscope. UV-vis spectra were recorded on Cary 50 Bio spectrometer. Cyclic voltammetry was performed on CHI600D electrochemical workstations with platinum as working electrode and platinum wire as counter electrode. Atomic force micrographs were obtained from Nova 1.026 RCI atomic force microscope with NT-MDT solver software analysis. Contact angle measurement was done Holmarc HO-IAD-CAM-01 instrument. Ellipsometric thickness measurement was performed using Filmetric F20-UV thin film analyzer. XPS measurements were done in Omicron Nanotechnology, GmbH XPS (ESCA)

3. Polymerization reaction on azide functionalized silicon wafer or ITO surface

In a 25 mL round bottom flask, Cu(I)I (12 mg) was mixed with 2 mL of nitrogen purged anhydrous dimethyl formamide. To it N,N-diisopropylamine (2 μ l) was added under the flow of nitrogen and degassed. The reaction mixture was stirred for 15 minute. A green colour solution was formed. The mixture solution was transferred to a degassed solution of 2,5-diethynylthiophene (6 mg) and 4,4-oxybis(azidobenzene) (12 mg) in tetrahydrofuran (5 mL) under nitrogen atmosphere in a 50 mL 2-neck rb flask where a 2X2 cm azide-functionalized silicon wafer or ITO surface was immersed. The mixture was heated for 72 h at 50 $^{\circ}$ C. The silicon wafer was taken out from the reaction mixture and washed thoroughly and repetitively with fresh toluene, acetone, water, dimethyl sulfoxide and ethanol in a sonicator to remove physisorbed polymer or unreacted materials.

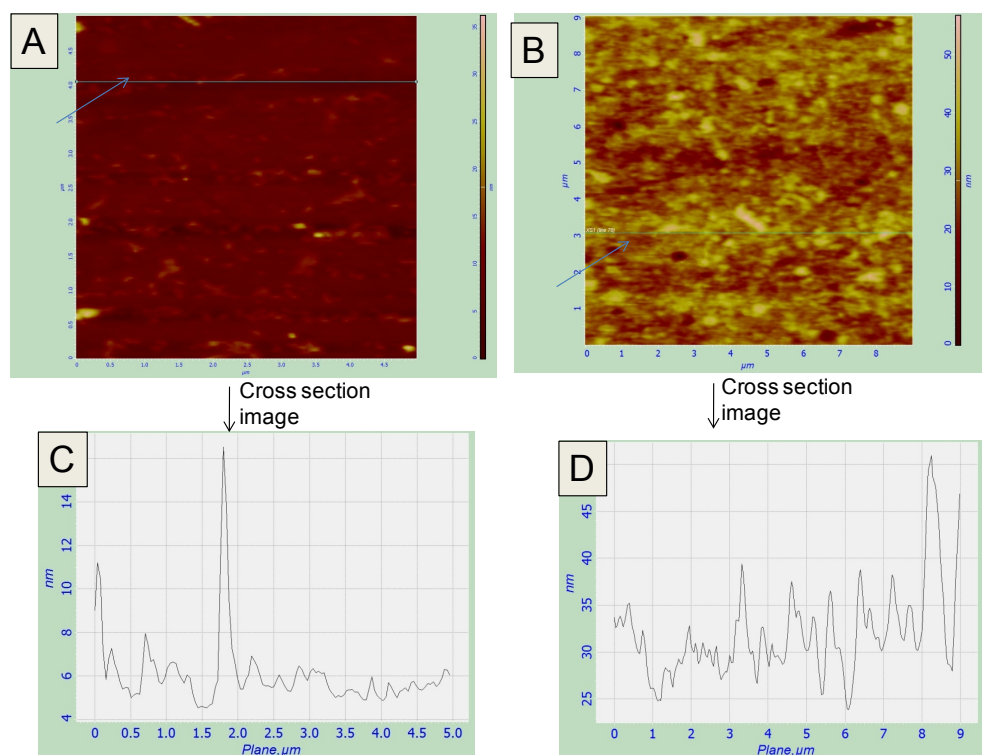


Fig. S1 (A) and (B) AFM image of azide and polymer functionalized silicon surface respectively. (C) and (D) cross section of azide and polymer functionalized surface respectively.

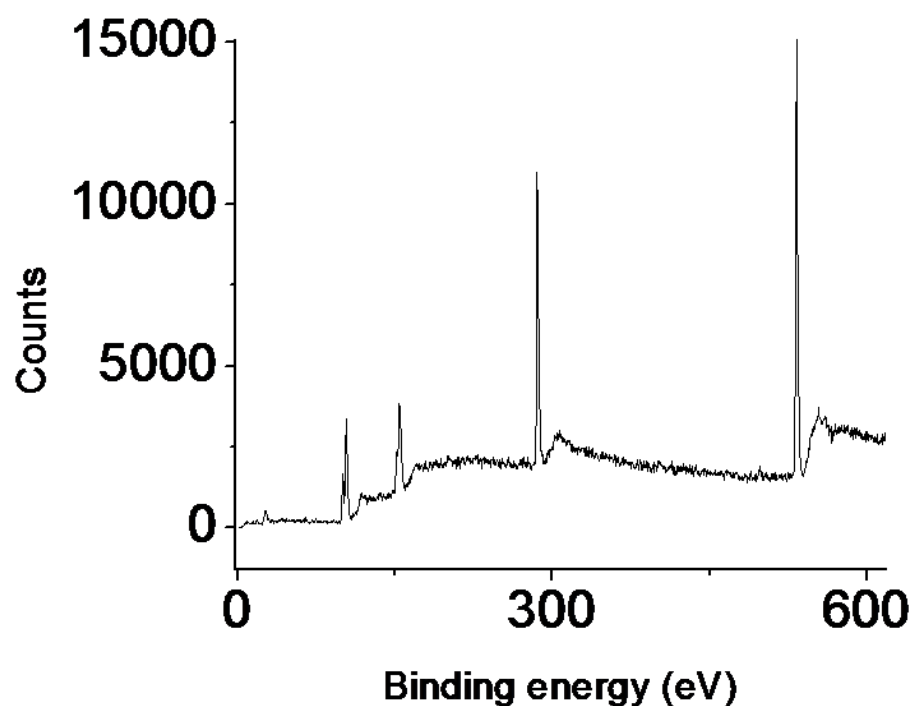


Fig. S2 XPS survey scan of silicon surface after control experiment where chloro terminated SAM was used instead of azide terminated surface for reaction with alkyne terminated thiophene

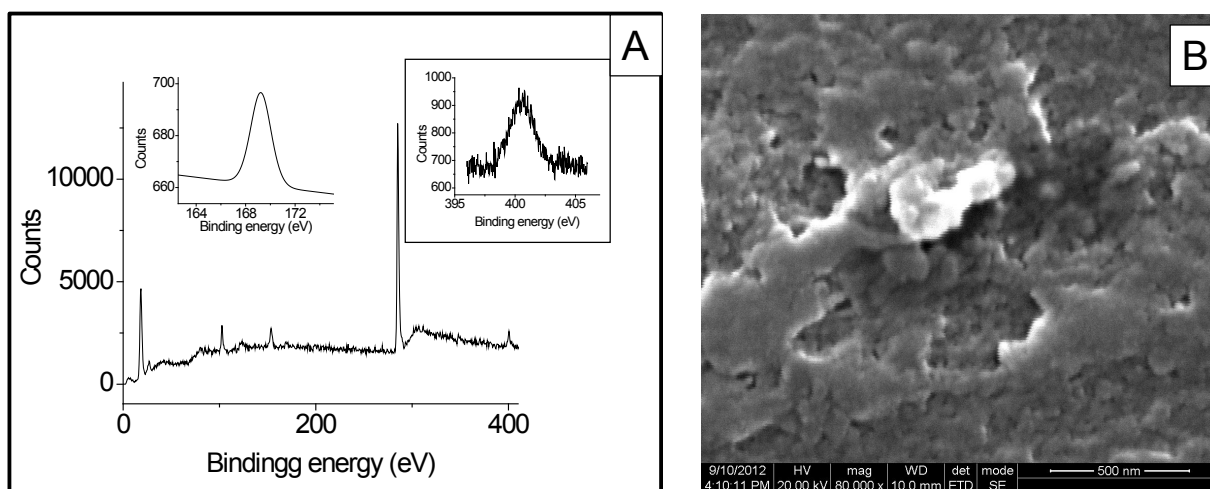


Fig. S3 (A) XPS survey scan of polymer functionalized ITO surface (Insets: multiplex-scan spectra for the S(2p) –after smoothing and N(1s) region). (B) SEM micrograph of ITO surface.

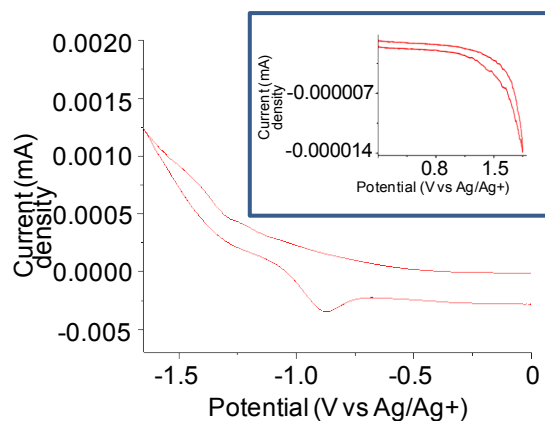


Fig S4 Cyclic voltammogram of polymer functionalized ITO surface (Scan in the negative region. Inset: scan in positive region)

- 1 P. Paoprasert, J. W. Spalenka, D. L. Peterson, R. E. Ruther, R. J. Hamers, P. G. Evans, P. Gopalan, *J. Mater. Chem.*, 2010, **20**, 2651.
- 2 J. Lewis, N. J. Long, P. R. Raithby, G. P. Shields, W. Y. Wong, M. Younus, *J. Chem. Soc.-Dalton Trans.*, 1997, 4283.
- 3 J. R. Thomas, X. Liu, P. J. Hergenrother, *J. Am. Chem. Soc.*, 2005, **127**, 12434.