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Cooperative International Science and Engineering Internships

Cooperative International Science and Engineering Internships(CISEI)
Winter 2009 - Student Projects

Student/School	Mentor	Faculty Sponsor	Department	Student Project
Igor Guzman Chemical Engineering/ University of Chile, Santiago, Chile	Justin Cochran and Gordon Smith	Michael Chabinyc	Materials	Study and Characterization of surface interfaces for Field Electric Transistors (FET)
Abigail Serrano Chemistry, Catholic University of Chile, Santiago	Hunaid Nulwala	Craig Hawker	MRL	Synthesis, Polymerization and Characterization of N-Vinyl Triazole Monomers

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Guzman's Project Page - CISEI Winter 2009

Intern: Igor Guzman, University of Chile, Santiago
Mentors: Justin Cochran and Gordon Smith
Faculty Supervisor: Michael Chabinyc
Department: Materials

Study and Characterization of surface interfaces for Field Electric Transistors (FET)

In specific instances for organic FET, abnormal behavior is observed in low k dielectric current-voltage measurements. This is attributed to the interaction happening in the semiconductor-insulator interface. The supposition is a non direct transport or an interrupted transport of charge between source and drain because of “traps”, changes in ionization energy between grains or molecules. The purpose of the study is investigating the existence of a relation or preferential orientation of semiconductor polymer layers and dielectric layers and how they relate to device current. To investigate this phenomenon characterization of surfaces were made using Atomic Force Microscopy (AFM) as a function of different parameters: polymer ($PBTTTC_{14}$, $PBTTTC_{16}$), coating techniques (Doctor Blade, Spin coating), temperature of solution, and the temperature of annealing process. The AFM results show no tendency for spin-coated films for the different parameters. A tendency is observed for the Doctor Blade technique, and reorganization after the annealing process is also observed, both tendencies are clearer for $PBTTTC_{16}$ than $PBTTTC_{14}$, and also homogeneous surfaces too. Additional studies using wide angle X-ray scattering will be done at the Stanford synchrotron. .

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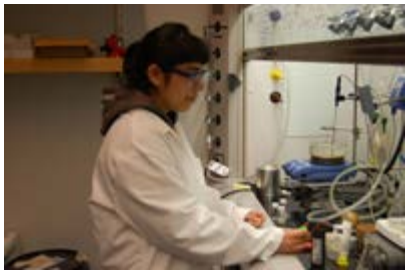
Serrano's Project Page - CISEI Winter 2009



Intern: Abigail Serrano, University of Chile, Santiago
Mentor: Hunaid Nulwala
Faculty Supervisor: Craig Hawker
Department: MRL

Synthesis, Polymerization and Characterization of N-Vinyl Triazole Monomers

N-vinyl polymers such as poly(N-vinylpyrrolidine) (PNVP), poly(N-vinylimidazole) (PNVI) and poly(N-vinylcarbazole) (PNVC), are of commercial importance. These polymers are extensively used in medical, food, and electronic industry. The major draw back of N-vinyl type monomers is the inability to incorporate functional groups which restricts its use in targeted applications. We now report the synthesis, polymerization and characterization of a new family of functionalized N-vinyl-1,2,3-triazole monomers that combine into a single structure many of the desirable features found in established monomers. A library of regioselective 1,4-N-vinyl triazole monomers were conveniently synthesized in high yields by employing Cu(I) click chemistry between an azide and alkyne followed by an efficient elimination reaction. The N-vinyl triazole were polymerized radically in a control fashion by O-ethyl-S-(1-phenylethyl)dithiocarbonate with 2,2'-azobis(isobutyronitrile) as an initiator. The effects of several parameters, such as solvent, temperature, monomer concentration, and mediator-to-initiator molar ratio, were examined in order to determine the conditions leading to optimal control of the polymerization. .

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