Title of Project: Polymers in Biomolecular Engineering and Molecular Electronics

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Short Description
Functional and stimuli-responsive polymers with novel properties, macromolecular structures and architectures are synthesized via controlled/living radical polymerizations. Conjugation with biomolecules produces a new family of biomaterials and biomedical materials. Some of the macromolecular architectures are also of relevance to the preparation of ultra-low dielectric constant (ultra-low-κ) materials for nano-electronics. The molecular design-cum-synthesis approach has allowed several polymer memories, including flash (rewritable) memory, write-once-read-many-times (WORM) memory and dynamic random access memory (DRAM) to be realized. A series of electroactive polymer systems has been designed and studied in an attempt to elucidate the memory property-molecular structure relationship. These polymers systems have included: (1) conjugated and non-conjugated polymers/copolymers with or without lanthanide complexes, (2) polymers exhibiting regioregularity and conformational states, (3) functional polyimides containing both electron donor (D) and acceptor (A) moieties, and (4) polymers containing hetero-molecules and polymer nanocomposites.

Recent publications of the group:
4. “A Non-volatile Polymer Memory Device Based on Bistable Electrical Switching in a Thin Film of Poly(N-vinylcarbazole) with Covalently Bonded C60”, Langmuir 2007, 23, 312