Stretchable and fully degradable semiconductors for transient electronics

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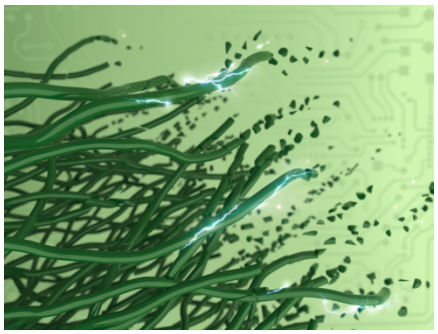

Next-generation electronics will autonomously respond to local stimuli and be seamlessly integrated with the human body, opening the doors for opportunities in environmental monitoring, advanced consumer products, and health diagnostics for personalized therapy. For example, biodegradable electronics promise to accelerate the integration of electronics with health care by obviating the need for costly device-recovery surgeries that increase infection risk. Moreover, the environmentally critical problem of discarded electronic waste would be relieved. The underpinnings of such next-generation electronics is the development of new materials with a wide suite of functional properties beyond our current toolkit. Organic polymers are a natural bridge between electronics and soft matter, where the vast chemical design space allows tunability of electronic, mechanical, and transient properties. Our research group leverages the rich palette of polymer chemistry to design new materials encoded with information for self-assembly, degradability, and electronic transport. In this talk, we will share our progress on the molecular design of acid-labile semiconducting polymers featuring imine bonds to maintain conjugation. Moreover, this talk will open with my personal journey towards and academic career.

Bio: Dr. Tran is an Assistant Professor at the University of Toronto in the Department of Chemistry (co-appointed in the Department of Chemical Engineering). Team Tran leverages the rich palette of polymer chemistry to design new materials encoded with information for self-assembly, degradability, and electronic transport. The creation of these multifunctional materials and an understanding of how they are utilized to construct next-generation electronics will serve as a platform to address previously inaccessible challenges impacting health and sustainability. Before coming to the University of Toronto, Dr. Tran was an Intelligence Community postdoctoral fellow at Stanford University under the mentorship of Prof. Zhenan Bao, where she worked on stretchable and biodegradable electronics. She completed her PhD in Chemistry at Columbia University in 2016 with Prof. Luis Campos, broadly investigating hierarchical ordering and periodic patterning in block copolymer systems. She received her BS in Chemistry with a minor in Chemical Engineering from the University of California—Berkeley in 2009, conducting undergraduate research with Prof. Tsu-Jae King Liu (Electrical Engineering). In the two subsequent years, Dr. Tran was a post-baccalaureate fellow in Dr. Ronald Zuckermann's research group at the Molecular Foundry at Berkeley National Labs, exploring the self-assembly of biomimetic polymers into 2D nanosheets.