Biomedical Discussion Group

Lecture: "Zebra Mussel-inspired Electrically Conductive Polymer Nanofiber"

Thursday June 11, 2015
2:30-3:30 pm
Davis Centre (DC), Room 1304

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Abstract:

Dopamine (DA) is a "sticky" biomolecule containing the typical functional groups of mussel adhesive proteins. It can self-polymerize to form a nanoscale polydopamine (PDA) thin film on various surfaces. Despite the DA polymerization mechanism and the PDA structure are not fully explored, PDA film has gained great interest for its promising applications, such as anti-corrosion coating, drug delivery, and nanocomposite functionalization. In this talk, we will present our recent research progress on the development of zebra mussel-inspired electrically conductive polymer nanofiber. It combined PDA with polypyrrole (PPy), which is one of the most extensively investigated conductive polymers because of its economic preparation, long-term stability and good biocompatiablity. Due to the synergetic effect of DA modification, PPy exhibit multifunctional and unique properties: the morphology changed from globular to fibrous; the PPy nanofibers can readily dispersed in water, the adhesion between PPy film and glass substrates was enhanced due to the adhesion properties of the PDA; and proper DA/pyrrole (Py) reacting ratios also led to PPy conductivity improvement. All these features, along with the intrinsic biocompatible nature of these two molecules, significantly improve the processability of PPy and broaden its potential applications in biomedical materials and devices. This work may also open the possibility of using this Mussel-inspired approach to functionalize other biocompatible conductive polymers; such materials could find broad applications in biomedical implants, scaffold, artificial muscles, and biosensors.

Biosketch:

A major theme of Dr. Zhao's research has been the adhesion and associated micro-mechanical properties of such soft materials as (synthetic and biological) polymers, sticky fluids and biological tissues, in particular, under micro and nano meter confinements. In contrast to the interfacial behavior of pure liquids and solids which have been extensively studied in the past century and are well described by the classic thermodynamics and contact mechanics (Hertz, JKR and DMT) theories, these soft materials and/or surfaces have much more complex behavior and are less understood, but play essential roles in the development of micro and nano technology, and biomedical engineering. His research combines novel experimental setup with biomimetic approaches and micro/nano tribological measurements to characterize these complex systems, and to discover new coating and adhesion strategies and approaches that can be incorporated and translated into materials and manufacturing processes for robust and responsive bonding.

If you are interested in meeting with Dr. Zhao, please email CBB.

Event is FREE – please RSVP via EventBrite.
Coffee/cookies will be available

Pay parking available in lots B or N (map). Visit: cbb.uwaterloo.ca for more information.

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