Canadian Association of Physicists
Association canadienne des physiciens et physiciennes

Contribution ID: **2265** Type: **Invited Speaker / Conférencier(ère) invité(e)**

Electrochemical gelation of telechelic protein polymers (I)

Sunday 10 June 2018 15:30 (30 minutes)

Amphiphilic secondary structures are ubiquitous in native proteins, where they serve a wide variety of functions from specific binding ligands to structural elements in supramolecular assemblies. This talk describes the use of amphiphilic coiled-coil motifs in modular protein polymers as a strategy to achieve electrochemical gelation capabilities. Our de novo electrogelation protein is a telechelic, triblock design comprised of a central spider silk glue motif flanked by terminal pH-triggered coiled-coil domains. The coiled-coiled domains were designed to form intramolecular helix bundles below a sharply-defined pH-trigger point, while the pH-responsive spider silk glue sequence serves both as an anionic electrophoretic transport element at neutral and elevated pH and as a disordered linker chain between the associated helix bundles at reduced pH. In an electrochemical cell, a solution of these telechelic proteins migrates toward the anode where the terminal coiled-coil domains are triggered to form coiled-coil assemblies that act as transient crosslinks for the e-gel state. Upon cessation of the current, the coiled-coil domains denature gradually and the e-gel transforms back into a fluid solution of polypeptides in a fully reversible manner. This simplified triblock protein design mimics many of the characteristics of more complex electrogelation proteins, such as silk fibroin. We discuss experimental and computational studies the physical properties of this protein and the potential for biomedical applications of electrochemically triggered gelation.

Authors: Dr LIN, Yinan (Tufts University); Dr AN, Bo (Tufts University); Dr BAGHERI, Mehran (University of Ottawa); Prof. KAPLAN, David L. (Tufts University); Prof. HARDEN, James L. (University of Ottawa)

Presenter: Prof. HARDEN, James L. (University of Ottawa)

Session Classification: Soft Matter Canada 2018 | Matière molle Canada 2018

Track Classification: Soft Matter Canada 2018