STIMULI-SENSITIVE INTRINSICALLY DISORDERED PROTEIN BRUSHES

Tech ID: 24657 / UC Case 2015-079-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,196,459	02/05/2019	2015-079

BRIEF DESCRIPTION

Recent advances in biomedicine and biotechnology are driving the demand for novel surface functionalization platforms for biologically active molecules. Polymer brush coatings form when macromolecular chains are end-tethered to surfaces at high grafting densities. While there have been notable successes integrating polymer brush coatings with proteins to control biological function, such strategies require covalent conjugation of the protein to the polymer, which can be inefficient and can compromise biological function. Moreover, these polymer brushes almost universally feature synthetic polymers, which are often heterogeneous and do not readily allow incorporation of chemical functionalities at precise sites along the constituent chains. To address these challenges, Researchers at the University of California, Berkeley (UCB) conducted experiments with polymer brushes based on nerve cell neurofilaments as the intrinsically disordered protein (IDP). By cloning a portion of a gene that encodes one of the neurofilament bristles, and re-engineering it such that they could attach the resulting protein to surfaces, UCB investigators have developed a biomimetic, recombinant IDP that can assemble into an environment-sensitive protein brush that swells and collapses dramatically with environmental changes in solution pH and ionic strength. Their research demonstrates that stimuli-responsive brushes can be efficiently integrated with proteins without compromising biological function, which could have broad commercial appeal as a new class of smart biomaterial building blocks.

SUGGESTED USES

- Biosensors
- Smart membranes
- Nanofluidic valves
- Signal responsive drug delivery

ADVANTAGES

- Does not compromise biological function
- Can be designed and purified to near-perfect homogeneity
- Easy to control size and chemical sequence
- Brush height may be modulated in situ to precise and predictable values

RELATED MATERIALS

- Stimuli-Sensitive Intrinsically Disordered Protein Brushes - 10/14/2014

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OTHER INFORMATION

KEYWORDS

smart membranes, signal responsive polymers, polymer brushes, nanofluidic valve

CATEGORIZED AS

- **Biotechnology**
  - Other
  - Proteomics
- **Materials & Chemicals**
  - Biological
  - Chemicals
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- **Nanotechnology**
  - NanoBio
- **Engineering**
  - Other

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