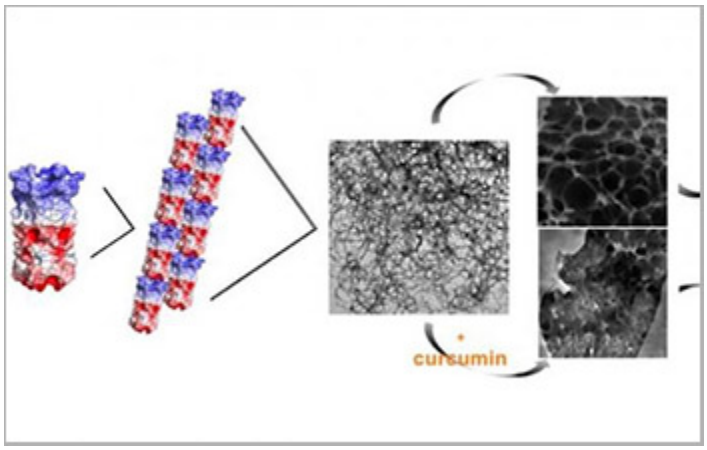
Research News

Researchers develop thermo-responsive protein hydrogel

Research crosses barrier needed to deliver drugs at the cellular level and to engineer tissue



An engineered protein self-assembles to form hydrogels at low temperature.

Credit and Larger Version (/discoveries/disc_images.jsp?cntn_id=299244&org=NSF)

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Imagine a perfectly biocompatible, protein-based drug delivery system durable enough to survive in the body for more than two weeks and capable of providing sustained medication release. Now a research team led by Jin Kim Monclare, a biomolecular and chemical engineer at the NYU Tandon School of Engineering (/cgi-bin/good-bye?https://engineering.nyu.edu/news/researchers-develop-thermo-responsive-protein-hydrogel), has created the first protein-engineered hydrogel that meets those criteria, advancing an area of biochemistry critical not only to the future of drug delivery, but also to tissue engineering and regenerative medicine.

Hydrogels are three-dimensional polymer networks that reversibly transition from solution to gel in response to physical or chemical stimuli such as temperature or acidity. These polymer matrices can encapsulate cargo, such as small molecules, or provide structural scaffolding for tissue engineering applications.

Montclare is lead author of a new paper in the journal *Biomacromoleculues* (/cgi-bin/good-bye?https://pubs.acs.org/doi/abs/10.1021/acs.biomac.9b00107) that details the creation of a hydrogel made up of a single protein domain that exhibits many of the same properties as synthetic hydrogels. Protein hydrogels are more biocompatible than synthetic ones and do not require potentially toxic chemical crosslinkers.

The research team discovered that small molecule binding allowed for release over a timeframe comparable to other sustained-release drug delivery vehicles. Future work will focus on designing protein hydrogels tuned to respond to specific temperatures for various drug delivery applications.

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