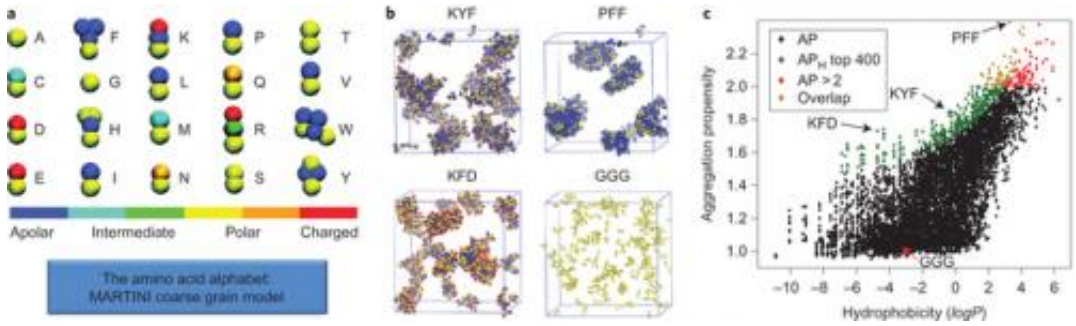
Breakthrough simplifies design of gels for food, cosmetics and biomedicine

December 10 2014



Screening for self-assembling tripeptides. Credit: *Nature Chemistry*, doi:10.1038/nchem.2122

(Phys.org) —Scientists at the University of Strathclyde and City University of New York have created methods that dramatically simplify the discovery of biological gels for food, cosmetics and biomedicine, as published in the journal *Nature Chemistry*.

Strathclyde's Dr Tell Tuttle and Professor Rein Ulijn, the director of nanoscience at City University New York's new advanced research centre who also holds a position at Strathclyde, believe their team's breakthrough dramatically simplifies discovery of functional gels that can be used in a wide range of applications.

Until now, discovery of new gels relied largely on chance discoveries. They developed a screening method to accurately predict how peptides –

the building blocks of living systems – could combine to form stable gels.

Professor Ulijn said: "Most people are familiar with the DNA as the code for life. This code translates into only 20 chemical building blocks – amino acids – that are combined in specific sequences, known as peptides, that provide structures of living systems.

"It is our aim to design structures based on peptides that are inspired by biology, but are much simpler, making them scalable, tunable, robust and functional and we now have predictive methods to achieve this."

The number of possible sequences of amino acids is huge, meaning it is not feasible to test them all – previously limiting the discovery of new candidate peptides for specific applications.

Prior to this discovery, there was no way to reliably predict whether a particular peptide – e.g. a tripeptide composed of three amino acids – would form a structure, such as a biological gel, and scientists would rely on chance or time-consuming individual experiments of each one.

Dr Tuttle said: "There are 8,000 possible tripeptides and we have developed computational methods to predict which of these could be used to develop materials with desirable properties.

"These methods led to the discovery of a new family of simple tripeptides that are able to form hydrogels at neutral pH. These materials are much simpler compared to the gels of biological systems but they have some interesting properties that may be exploited in various areas, such as cell culture and ingredients for cosmetics."

More information: "Exploring the sequence space for (tri-)peptide self-assembly to design and discover new hydrogels." *Nature Chemistry*,

DOI: 10.1038/nchem.2122