

## **Bhatnagar awardee's research opens up prospects of bio-inspired materials for energy & biotechnology sector**

Scientists have developed a synthetic material that mimics the dynamic capability of living organisms to adapt to new environments by utilizing simple natural design principles to create complex networks. The new materials developed opens new avenues for smart materials because of their dynamic and adaptive nature. Hence they would be useful as recyclable polymers for the energy and biotechnology sector.

Reduction–oxidation (redox) processes are central to many biological functions. Cellular functions like growth, motility, and navigations depend on assembling of biopolymers whose dynamic behavior is linked to a reduction-oxidation (redox) reaction in which enzymes are involved.

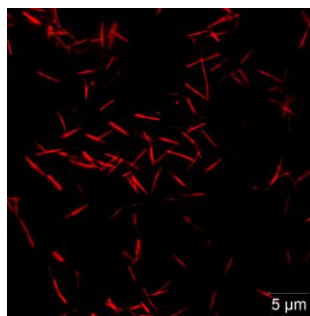
Nature synthesizes these biopolymers controlling their size and dispersity to regulate their functions, without which their sophistication and efficacy are affected. Researchers have been trying to mimic such complex structural control based on chemical reaction networks.

Scientists from the Jawaharlal Nehru Centre for Advanced Science and Research (JNCASR), an autonomous institution of the Department of Science and Technology (DST), have developed a synthetic mimic of such redox-active biological assemblies, with precise structure and dynamics that can be manipulated.

In their recently published work in Nature Communications (<https://www.nature.com/articles/s41467-020-17799-w.pdf>), Prof. Subi George, a Bhatnagar awardee of 2020, and his group have shown that such bio-inspired structures are formed by assembling transient dormant monomeric molecules (basic units of polymers) by coupling them to a reduction-oxidation reaction network. They form a chemical entity called supramolecular polymers with strikingly dynamic properties. The properties arise because they are connected by non-covalent bonds, which are reversible bonds that hold their chains together. These dynamic properties open up prospects of many new applications of these materials.

The research by the team, which also included Krishnendu Jalani, Anjali Devi Das, and Ranjan Sasmal, is a major step towards the goal of chemists to harness blueprints of life to design innovative materials and provide future energy or biotechnology-related solutions.

For more details, Prof. Subi George ([george@jncasr.ac.in](mailto:george@jncasr.ac.in); 99167 29572) can be contacted.



*Image of the redox responsive supramolecular fibers*