

Synthetic Biology

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Session Abstract

Synthetic biology is an emerging discipline that combines science and engineering approaches to control biological networks. Research efforts in the field are impacting biomedicine and bioengineering, automation science and engineering, biomaterials science and engineering, and biomolecule manufacturing. In this session, we will have four talks. The first speaker, Lingchong You (Duke University), will provide insight into how bacteria can be programmed, using the tools of synthetic biology, to function differently with respect to time and space. Next, Timothy Lu (Massachusetts Institute of Technology) will detail how synthetic biology and its controlled networks can be used to create biological computers. These first two talks will demonstrate how synthetic networks can provide fundamental control of information flow in biological systems. The next two talks will then provide examples of how this information control can be applied to solve problems in energy and medicine. To this end, synthetic biologists have already created new pathways to fuels and therapeutics. The third talk by Hao Song (Tianjin University) will describe how the electron transfer pathway in cells can be reengineered for energy. Finally, Zhen Xie (Tsinghua University) will show how synthetic gene networks can be used as a potential therapeutic for liver cancer. Overall, synthetic biology provides scientists and engineers a toolkit to precisely control the design and function of biological systems for useful purposes. Synthetic biology is still expanding as a discipline with new subfields being incorporated regularly. In the years to come, the field holds the potential to have significant impact in many areas of science and engineering as it continues to develop and moves towards realizing its full potential.