**Carbohydrate would be new oil via a new biomanufacturing platform**

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The sustainability revolution is occurring in the 21st century when we start utilizing more and more renewable resources instead of depleting fossil fuels. Oil is the primary energy source, but it will be replaced with some cheap and renewable energy sources eventually. The largest production challenge of biocommodities (e.g., biofuels, renewable chemicals, and even food) is the economically viable production with satisfying three manufacturing criteria: high product yield, fast productivity and easy product separation. In vitro synthetic biosystem (IVSB) implements complicated biological reaction via the in vitro assembly of numerous standardized and exchangeable enzymes or their complexes and/or (biomimetic) cofactors [[1](#_ENREF_1)]. Compared to microbial fermentation, IVSB features numerous manufacturing advantages, such as high product yield, fast reaction rate, easy product separation, easy access and control for open systems, tolerance of toxic compounds and broad reaction conditions, and so on.

In this talk, I will introduce the concept of this new technology platform; present its three large applications: (i) sweet hydrogen produced from sugars [[2](#_ENREF_2)]; (ii) synthetic starch made from nonfood biomass [[3](#_ENREF_3)], and (iii) high-energy density sugar biobattery [[4](#_ENREF_4)]; as well as conduct energy efficiency analyses for guiding future energy directions, especially for the transportation sector [[5](#_ENREF_5)] . In a word, IVSB would lead to a biomanufacturing paradigm shift and carbohydrate would be the best energy storage carrier, replacing crude oil [[6](#_ENREF_6)].

**References**

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