



## Microbial Conversion of Glucose to Styrene and Derivatives

AzTE Case # M11-063

### Inventors

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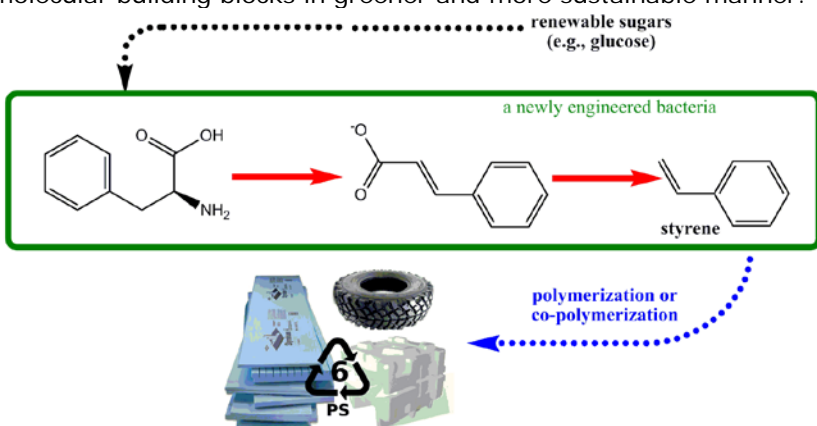
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### Invention Description

Styrene is a versatile monomer that is widely used to produce polystyrene and other polymers. Styrene is typically produced by the chemo-catalytic dehydrogenation of petroleum-derived ethylbenzene. This process is both highly energy-intensive and reliant on unsustainable, petroleum feedstocks. A means to produce styrene that is both more energy efficient and sustainable would have immediate commercial applications.

Researchers at Arizona State University have engineered a novel strain of *E. coli* that converts renewable sugars (glucose) into styrene. As proof of concept, shake flask cultures of 1st generation strains have reached styrene titers of over 260 mg/L within 24 hours. The co-expression of an additional heterologous gene can be incorporated to further convert the styrene to styrene oxide (a chiral compound used in the production of some cosmetics and pharmaceuticals).

This method is scalable to industrial volumes and promises the ability to produce important molecular building blocks in greener and more sustainable manner.



### Intellectual Property

#### Status:

Patents Pending

### Contact

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### Potential Applications

- Synthesis of monomeric styrene for the production of:
  - Polystyrene
  - other polymers and copolymers
- Synthesis of styrene oxide for the production of:
  - pharmaceuticals (such as levamisole, used in dermatology)
  - cosmetics

### Benefits and Advantages

- Sustainable – uses renewable sugars, such as glucose, as the feedstock
- Greener alternative to petroleum-derived styrene
- Low energy requirements relative to conventional production methods (which require  $>10^7$  BTU of steam/ton of petroleum-derived styrene produced)
- Produces enantiomerically pure compounds requiring no resolution