

Making Isoprene from Biomass Material using *Bacillus* Species

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Introduction. The overarching goal of this project is to understand the pathway of isoprene production in *Bacillus subtilis*, to serve as the basis for genetically modifying the pathway to substantially increase the yield of isoprene from biomass. The following specific aims are proposed:

1. identify the bacterial isoprene synthase in *Bacillus subtilis*, the last enzyme in the isoprene biosynthesis pathway, which is currently unknown.
2. characterize the regulation of the isoprene biosynthesis pathway.
3. develop predictive models of the metabolic networks of *B. subtilis* to identify targets for experimental manipulation of this strain.

To accomplish the proposed specific aims, a multi-disciplinary team from the Bioproducts, Science, and Engineering Laboratory (BSEL) of Washington State University (WSU) will work with investigators from the Environmental Molecular Sciences Laboratory (EMSL) at PNNL. Normal and genetically modified versions of *Bacillus subtilis* provided by WSU will be analyzed by the transcriptomics, proteomics and metabolomics capabilities of EMSL. The resulting data will be integrated and used as a basis for identifying the isoprene synthetase gene and for understanding its regulation.