Examining Bioethanol-Producing Ultrastructures with Electron Microscopy and Molecular Dynamics

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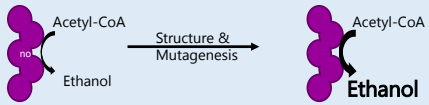
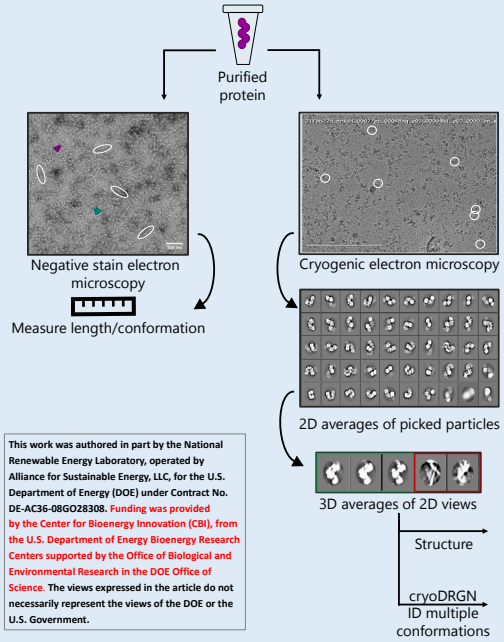
Background

AdhE makes ethanol and other long chain alcohols in consolidated bioprocessing organisms like *Clostridium thermocellum*. *C. thermocellum* is an ideal microbe because it effectively degrades cellulose, so we only need to amplify its biosynthesis of ethanol. Our aim is to improve alcohol production and tolerance by determining the *C. thermocellum* AdhE atomic structure in multiple conformations to understand its chemical mechanism and guide mutagenesis.



Graphical Methods



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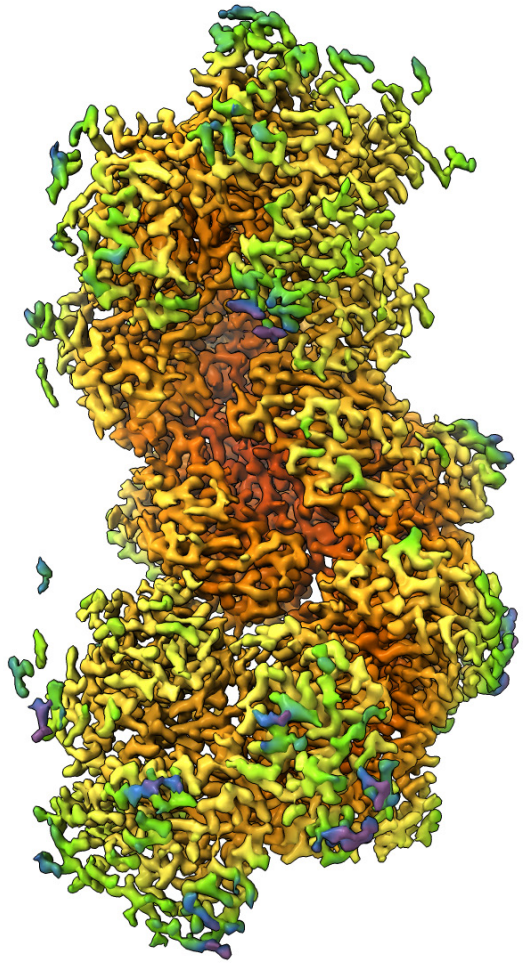
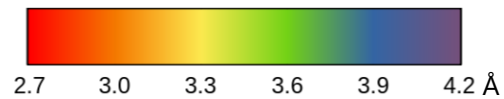
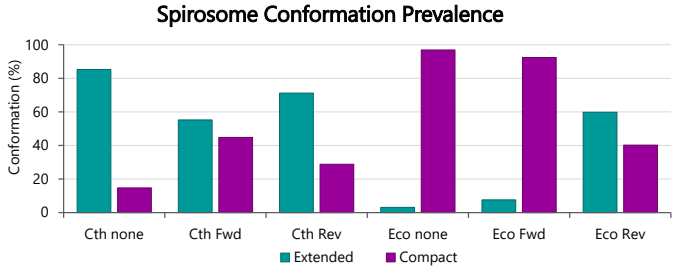
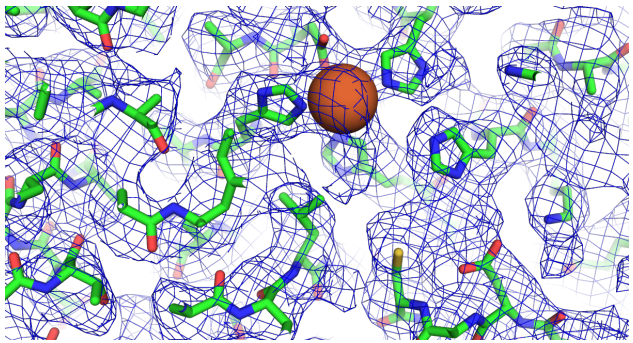
Mutagenesis of the AdhE spirosome to **improve ethanol production** is confounded by native **ultrastructure flexibility** of conformation

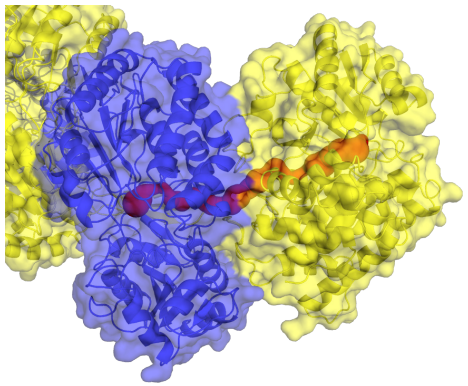








Density of the iron-coordinated active site of the alcohol dehydrogenase domain



Enclosed channel between the aldehyde dehydrogenase and alcohol dehydrogenase domains of two AdhE molecules

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