

***Lab on a Chip* paper unveils protein purification process expected to enable discoveries in bioenergy research**

One area of Sandia research significant to the Joint Bio-Energy Institute (JBEI) effort has been protein purification and analysis. Recent developments in this technology space were recognized in the 2008 Volume 8 edition of *Lab on a Chip* – a leading microfluidics scientific journal – which featured a Sandia paper on its [front cover](#).

The paper is titled [*Rapid, continuous purification of proteins in a microfluidic device using genetically-engineered partition tags*](#). Authored by SNL/CA's Robert Meagher, Yooli Light, and Anup Singh (all 8321), it describes a rapid, automated microscale process for isolating specific proteins from sub-microlitre volumes of *E. coli* cell lysate.

This novel approach addresses the need for high-throughput purification of minute amounts of native and recombinant proteins, which is currently necessary in drug discovery, enzyme engineering, and other life sciences. High-throughput screening requires availability of large numbers of purified proteins, but current purification techniques are too slow, expensive, and hard to automate.

For JBEI, the microfluidics-based technique is key in that it will allow for much faster enzyme purification and analysis, provide a more automated engineering method, and use smaller amounts of cell mass to produce proteins.

“The process of turning biomass into ethanol or other forms of transportation fuel involves several pretreatment steps that break up lignocellulosic material into easily converted polymers,” explains Blake Simmons, a Sandia chemical engineer and the VP for Deconstruction for the JBEI effort.

“It (processing of biomass) can be a difficult and often costly process, but certain enzymes have been found to efficiently break down cellulose into sugars,” added Anup, senior author of the *Lab on a Chip* paper and director of biochemical analysis for JBEI. Sandia's technique, he says, combined with high-throughput cell culture methods, will allow thousands of enzymes and their variants to be purified and screened rapidly, which should significantly aid researchers as they search for the most optimal enzyme that meets their processing needs.

Sandia's JBEI effort builds on its expertise in science-based engineering, computational science, and microsystems. The lab's capabilities in enzyme engineering, systems biology, membrane transport, protein expression, and hyperspectral imaging are all expected to contribute significantly to the DOE JBEI mission.