FROM LAB TO MARKET: DESIGNING A COST MODEL FOR CATALYST SCALING

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Sensitivity analyses performed for biomass conversion models routinely show that catalyst cost has a significant impact on process economics. For example, design reports for the indirect liquefaction through methanol/dimethyl ether intermediates and *in-situ/ex-situ* catalytic fast pyrolysis indicate that catalyst cost is one of the top 12 parameters affecting the minimum fuel selling price. Thus, uncertainties in catalyst cost, especially for novel and pre-commercial materials, contribute to the financial risk in bringing biomass conversion processes to the commercial scale. This presentation will describe the ongoing development of a spreadsheet-and web-based catalyst cost model designed to provide estimates of the costs associated with manufacturing pre-commercial catalysts early in their development cycle. The tool is being developed to (1) assist in the rapid assessment of economics for novel catalytic materials (e.g. colloidal nanoparticle catalysts) allowing quicker down-selection and reducing the time and cost associated with developing materials that are prohibitively expensive, (2) improve techno-economic analyses and minimum fuel selling price estimates by providing more accurate catalyst costs, and (3) provide a deeper understanding for the assessment of economic, environmental, and societal impacts of catalyst procurement. The underlying methodologies employed by the catalyst cost model will be discussed, including the determination of raw material prices at scale, translation of small-scale synthetic procedures to commercially relevant processing steps, scale-up paradigm (i.e., volumetric versus parallelization), and environmental and recycling/waste considerations.