Selective Production of C2 Hydrocarbons through Non-oxidative Direct Conversion of Methane

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The recent discovery of vast reserves of shale gas has led to extensive research on the synthesis of valuable chemicals from methane. Despite the potential importance, most methane conversion technologies are not commercially viable due to their low carbon efficiency. Non-oxidative conversion of methane could be an alternative approach to produce light olefins and aromatics. A key challenge for direct methane conversion is the increase in maximum one-pass yields without coke formation through catalyst design and optimization of reaction parameters.
In this presentation, we will discuss how to precisely control the product selectivity, including C1-C5 alkanes, C2-C5 alkenes, C2 alkynes, and (alkyl-) aromatics. By using the catalyst under optimized reaction condition in the presence of hydrogen, we have successfully adjusted the product selectivity, especially C2 species (ethane, ethylene, and acetylene). Catalytic performances with various reaction parameters were observed and we tried to elucidate the differences in reactivity to both gas phase and catalytic surface reactions.