Gold nanoparticles supported on carbon materials demonstrate remarkable activity and/or selectivity in various reactions. However, the surface properties of carbon materials can greatly differ depending on the preparation method and post-treatments. For example, carbon surface can be easily functionalized by incorporating other elements, such as oxygen and nitrogen, which in turn would affect carbon surface polarity and acid-base characteristics. These parameters are expected to strongly influence the activity, selectivity and stability of supported gold catalysts.

In this work, we prepared and characterized a set of Au catalysts (2-4 nm particle size) supported on high surface area graphite (HSAG) materials with different surface characteristics, but the same morphology. The catalysts have been investigated for the oxidation of 5-hydroxymethylfurfural (HMF) and hydrogenation of butadiene.

The observed strong differences in activity and selectivity between catalysts immobilized on the modified HSAG supports primarily originate from the differences in the reactant and intermediate adsorption on the surface of the catalysts, as will be discussed in more detail in the conference contribution. Furthermore, a comparison of a catalyst behavior as a function of carbon surface properties in a gas-phase reaction (hydrogenation of butadiene), as well as the guidelines for the rational design/choice of optimal carbon supports for highly active, selective and stable Au catalysts will be also given in the conference contribution.

References


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