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Atmospheric-pressure cold plasma for synthesizing supported metal catalysts with the assistance of ethanol

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Cold plasma is a non-equilibrium plasma, in which the gas temperature remains at low temperature (may near room temperature) while the electron temperature can reach several thousands of Kelvin or even more. Cold plasma has been proved to be an efficient method for synthesizing supported metal catalysts.[1] According to the working pressure, cold plasma can be categorized into two groups: low-pressure (LP) cold plasma and atmospheric-pressure (AP) cold plasma. As for AP cold plasma, the electron temperature is not high enough to reduce the metal ions directly due to the frequent collisions among the electrons and the heavy ions. Therefore, H_2 gas (or other H-containing gases, e.g. CH_4) is usually added into the working gas to generate active hydrogen species (H, H^*, H_2^*, etc.) to reduce the metal ions. In this talk, we report an alternative AP cold plasma method for synthesizing supported metal catalysts using ethanol instead of explosive H_2 gas and toxic reducing agents. The TOF value of the prepared Pd/P25 catalyst at 120 ^oC is 3.1 times of that prepared by cold plasma using H_2 gas due to the protection of the formed carbon species.[2] AP cold plasma using ethanol as the origin of active hydrogen species is safer and more efficient than that using H_2 gas, and may also have great potentials to synthesize other supported metal catalysts.

References

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