

Surface ionics/protonics for catalysis at low temperatures

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We have found that heterogeneous catalytic processes can be promoted by surface ionics/protonics even at low temperatures as 423 K or lower. These catalytic processes lead to on-site and on-demand hydrogen and ammonia production, olefin production and so on.

Application of the electric field to the metal catalyst supported on semiconductor enabled low temperature reaction even at 423 K for methane steam reforming and ammonia synthesis. The surface protonics by the application of electric field serves an important role in the enhancement of catalytic methane steam reforming at low reaction temperatures. Surface ionics/protonics creates a novel catalytic reaction mechanism and enhances heterogeneous (gas-solid) catalytic reactions. Both exothermic and endothermic reactions are promoted at low temperatures via surface ionics/protonics, including methane oxidative coupling, carbon dioxide activation, hydrogen production, ammonia synthesis and so on.