

The microwave-controlled catalytic reactions

-Its theory and application-

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Microwaves selectively create a local hot spot and accelerate various chemical reactions. Microwave chemical processes can replace conventional energy-intensive processes by accelerating chemical reactions, lowering reaction temperatures, and saving energy consumption. Moreover, microwave processes can be used to make chemicals with electricity derived from renewable sources. The microwaves can be applied to various chemical processes such as CO₂ utilization and biomass conversion as a "carbon neutral" technology. Although many previous works demonstrate the efficiency of microwaves in reaction acceleration, most of their mechanism is not clearly understood. Furthermore, it is expected to achieve precise control of the reaction acceleration by microwaves. This talk introduces our recent research on the mechanistic analysis of catalytic reactions accelerated by microwaves and its applications to various chemical reactions such as water oxidation and biomass conversion.

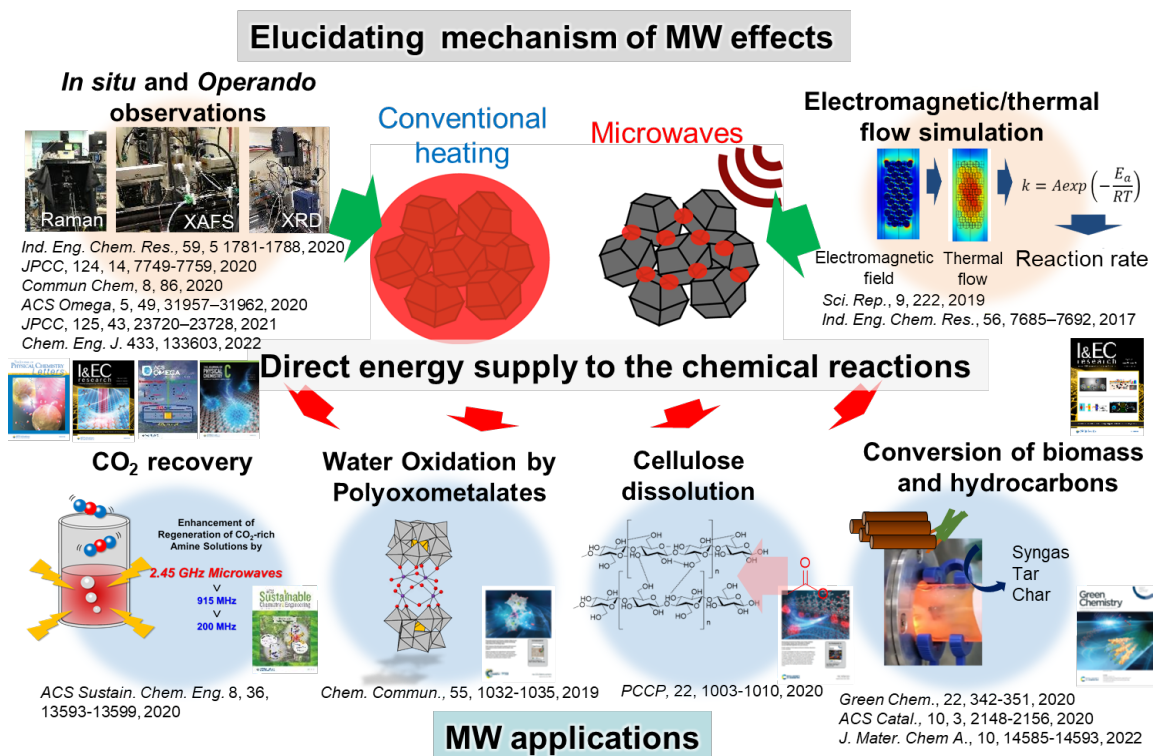


Figure. The elucidation of the mechanism of microwave effects and their applications.