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Electro-optical synergy on plasmon-exciton co-driven surface catalytic reactions

Mengtao Sun

University of Science and Technology Beijing, China

The monolayer graphene-Ag nanoparticles hybrids system is fabricated as the electro-optical coordinated controlled substrate of Surface-Enhanced Raman Scattering (SERS) spectroscopy. Plasmon-exciton coupling interactions of this hybrid system are systemically investigated and applied in the field of surface catalytic reactions, manipulated by the electro-optical synergy. Our experimental results demonstrate that plasmon-exciton coupling interaction co-driven surface catalytic reactions can not only be controlled via plasmon-exciton coupling, but also by gate voltages and electric current (or bias voltage). The gate voltage can tune the Density of State (DOS) of hot electrons and electric current can make the hot electrons with higher kinetic energy. Both of them can significantly promote plasmon-exciton co-driven surface catalytic reaction. Our electro-optical device based on plasmon-exciton coupling can be potentially applied in the fields of sensor, catalysis, energy and environment.

mengtaosun@ustb.edu.cn