



# Modifying molecule-surface scattering by ultrashort laser pulses

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In recent years it became possible to align molecules in free space using ultrashort laser pulses. Here we explore two schemes for controlling molecule-surface scattering process, which are based on the laser-induced molecular alignment. In the first scheme, a single ultrashort non-resonant laser pulse is applied to a molecular beam hitting the surface. This pulse modifies the angular distribution of the incident molecules, and causes the scattered molecules to rotate with a preferred sense of rotation (clockwise or counter-clockwise). In the second scheme, two properly delayed laser pulses are applied to a molecular beam composed of two chemically close molecular species (isotopes, or nuclear spin isomers). As the result of the double pulse excitation, these species are selectively scattered to different angles after the collision with the surface. These effects may provide new means for the analysis and separation of molecular mixtures.

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