UNIFIED MICROSCOPIC-MACROSCOPIC MONTE CARLO SIMULATION OF ICE FORMATION ON INTERSTELLAR GRAINS

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Results of ice formation on interstelar grains by full microscopic-macroscopic Monte Carlo simulation of gas-grain chemistry in cold dense interstellar clouds are reported. Gas phase chemical kinetics is treated by macroscopic Monte Carlo approach while reactions on grain are treated by microscopic Monte Carlo simulation. More than 200 diffusive surface reactions are included in the simulation and we model how photons penetrate thick layers of species and photodissociate species. Ice mantle on grain surfaces gradually build up as species accrete fron gas phase and react on the grain surface. Photodissociated species are allowed to diffuse and react within ice mantle. Our results can be compared with observations.