Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Rotational Energy Exchange in Molecule-Surface Collisions[1]
HAILEMARIAM AMBAYE, JOSEPH MANSON, Clemson University — A theoretical approach that combines classical mechanics for treating translational and rotational degrees of freedom and quantum mechanics for describing the excitation of internal molecular modes is applied to the scattering of diatomic molecules from metal surfaces. Calculations are carried out for determining the extent of energy transfer to the rotational degrees of freedom of the projectile molecule. For the case of observed spectra of intensity versus final rotational energy, quantitative agreement with available experimental data for the scattering of NO and N_2 from close packed metal surfaces is obtained. It is shown that such measurements can be used to determine the average rotational energy of the incident molecular beam. Measurements of the exchange of energy between translational and rotational degrees of freedom upon collision are also well described by calculations for these same systems.

[1]Work supported by the NSF and DOE

Joseph Manson
Clemson University

Date submitted: 30 Nov 2005 Electronic form version 1.4