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Thermal Accommodation Coefficients Based on Heat-Flux Measurements MICHAEL A. GALLIS, WAYNE M. TROTT, JOHN R. TORCZYNSKI, DANIEL J. RADER, Sandia National Laboratories — A new method to determine the thermal accommodation coefficient of gases on solid surfaces based on heat-flux measurements is presented. An experimental chamber and supporting diagnostics have been developed that allow accurate heat-flux measurements between two parallel plates. The heat flux is inferred from temperature-difference measurements across the plates using precision thermistors, where the plate temperatures are set with two carefully controlled thermal baths. The resulting heat flux is used in a recently derived semi-empirical formula to determine the thermal accommodation coefficient. This formula has the advantage of eliminating the ∼8% discrepancy between molecular simulations and the predictions of the more approximate Sherman-Lees formula used in most studies. Nitrogen, argon, and helium on stainless steel with various finishes and on other silicon-based surfaces are examined. The thermal accommodation coefficients thus determined indicate that the Maxwell gas-surface interaction model can adequately represent all of the experimental observations. Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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