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Thermophoresis of Nano Platelets in Confined Space STEFFEN HARDT, Institute for Nano-and Micro Process Technology, University of Hannover, Callinstr. 36, 30167 Hannover, Germany — For several decades it has been known that a rigid body immersed in a gas of nonuniform temperature experiences a thermophoretic force aligned with the temperature gradient. If however, a body is placed in a narrow gap between two solid walls of uniform, but different temperature, a thermophoretic force perpendicular to the temperature gradient can be created. In this work an analytical expression is derived for the force experienced by a nano platelet between two walls of different temperature. It is assumed that the in-plane extension of the platelet is larger than the gap width and that the gas dynamics occurs in the free-molecular flow regime. For the case that the gas molecules are diffusively reflected from the walls, it can be shown that the wall collision rate is constant over the whole computational domain. Based on this insight, expressions for the force and the torque on a nano platelet in a narrow gap are derived. It is shown that the torque vanishes, whereas there is a net force perpendicular to the temperature gradient. When considering thermal fluctuations on top of the average force it becomes apparent that in such a way a thermophoretic motion of a platelet can be induced.

Steffen Hardt
Institute for Nano-and Micro Process Technology,
University of Hannover, Callinstr. 36, 30167 Hannover, Germany

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