

Explanation for friction: Origin of sliding friction between solid objects

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Friction is a key phenomenon in applied physics, whose origin has been studied for centuries. Until now, it has been understood that mechanical wear-resistance and fluid lubrication affect friction, but the fundamental origin of sliding friction has been unknown. Dr. Lasse Makkonen, Principal Scientist at VTT Technical Research Centre of Finland, has now presented an explanation for the origin of sliding friction between solid objects.

According to his theory, the amount of friction depends on the surface energy of the materials in question.

Friction has a substantial effect on many everyday phenomena, such as energy consumption. Makkonen's model is the first to enable quantitative calculation of the friction coefficient of materials.

According to Makkonen's theory, the amount of friction is related to the material's surface energy. Friction originates in nanoscale contacts, as the result of new surface formation. The theory explains the generation of frictional force and frictional heating in dry contact. It can be applied in calculating the friction coefficient of various material combinations.

The model also enables the manipulation of friction by selecting certain surface materials or materials used in lubrication layers, on the basis of the surface energy between them.

Makkonen's theory on sliding friction was published in the journal *AIP Advances* of the American Institute of Physics. The research was funded by the Academy of Finland and the Jenny and Antti Wihuri Foundation.

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1. Lasse Makkonen. **A thermodynamic model of sliding friction**. *AIP Advances*, 2012; 2 (1): 012179 DOI: [10.1063/1.3699027](https://doi.org/10.1063/1.3699027)

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