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Article

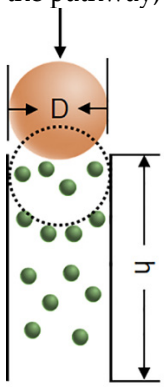
Probing Contact Electrification between Gas and Solid Surface

Linlin Sun [1,2], Ziming Wang [1], Chengyu Li [1], Wei Tang [1,3,4,*] and Zhonglin Wang [1,3,5,*]

[1] CAS Center for Excellence in Nanoscience, Beijing Institute of Nanoenergy and Nanosystems, Chinese Academy of Sciences, Beijing 101400, China
[2] College of Mechanical and Electronic Engineering, Shandong Agricultural University, Taian 271000, China
[3] School of Nanoscience and Technology, University of Chinese Academy of Sciences, Beijing 100049, China
[4] Institute of Applied Nanotechnology, Jiaxing 314031, China
[5] School of Materials Science and Engineering, Georgia Institute of Technology, Atlanta, GA 30332, USA
* Correspondence: tangwei@binn.cas.cn (W.T.); zhong.wang@mse.gatech.edu (Z.W.)

Note 1: Formula derivation for the transferred charge amount during a solid particle falling.

The derivation is modelled on that of the mean free path of gas molecules. Considering that the solid particle with a diameter of D, falls through a distance of h, and assuming that it collides with all gas molecules in the pathway, as shown below:



When the number density of the gas molecules is n, the number of collisions totally happen during the particle falling, can be expressed as:

$$N = \frac{1}{4} n h \pi D^2 \tag{S1}$$

Since not every time collisions will result in charge transferring, we assume a charge transferring coefficient of η caused by each collision, and thus conclude that the charge transferring amount during falling is approximatively determined by:

$$\Delta Q = \frac{1}{4} \eta n h \pi D^2 \tag{S2}$$

Table S1. The η of other materials.

Materials	η
PTFE	2.91×10^{-23} nC
POM	2.76×10^{-23} nC
PP	2.45×10^{-23} nC
PA	1.07×10^{-23} nC

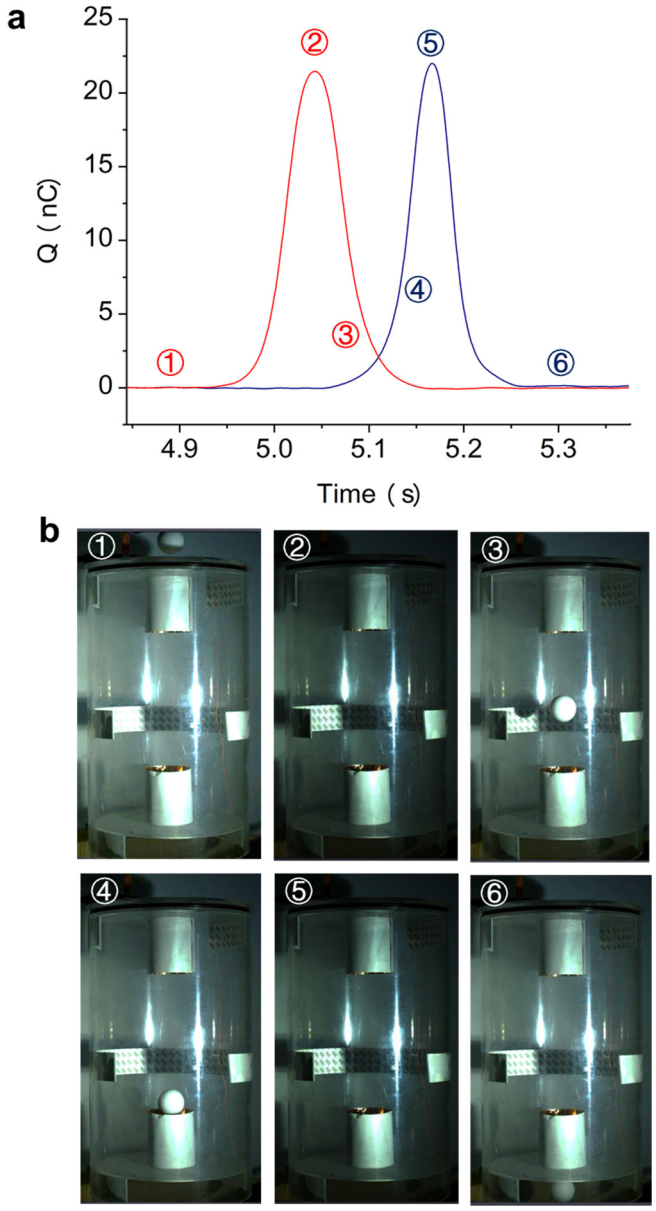


Figure S1. The movement process of the polymer. (a) The correspondence between output of electrometer and motion of polymer. (b) Snapshots showing the motion of the polymer.

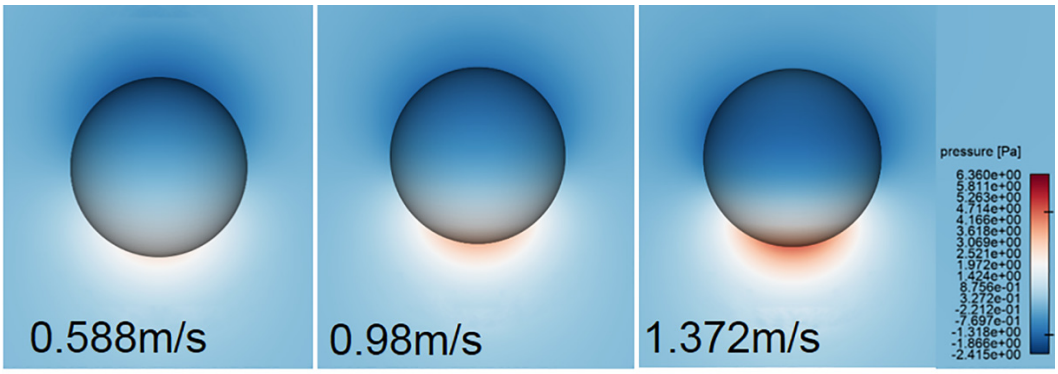


Figure S2. The relationship between pressure and velocity.

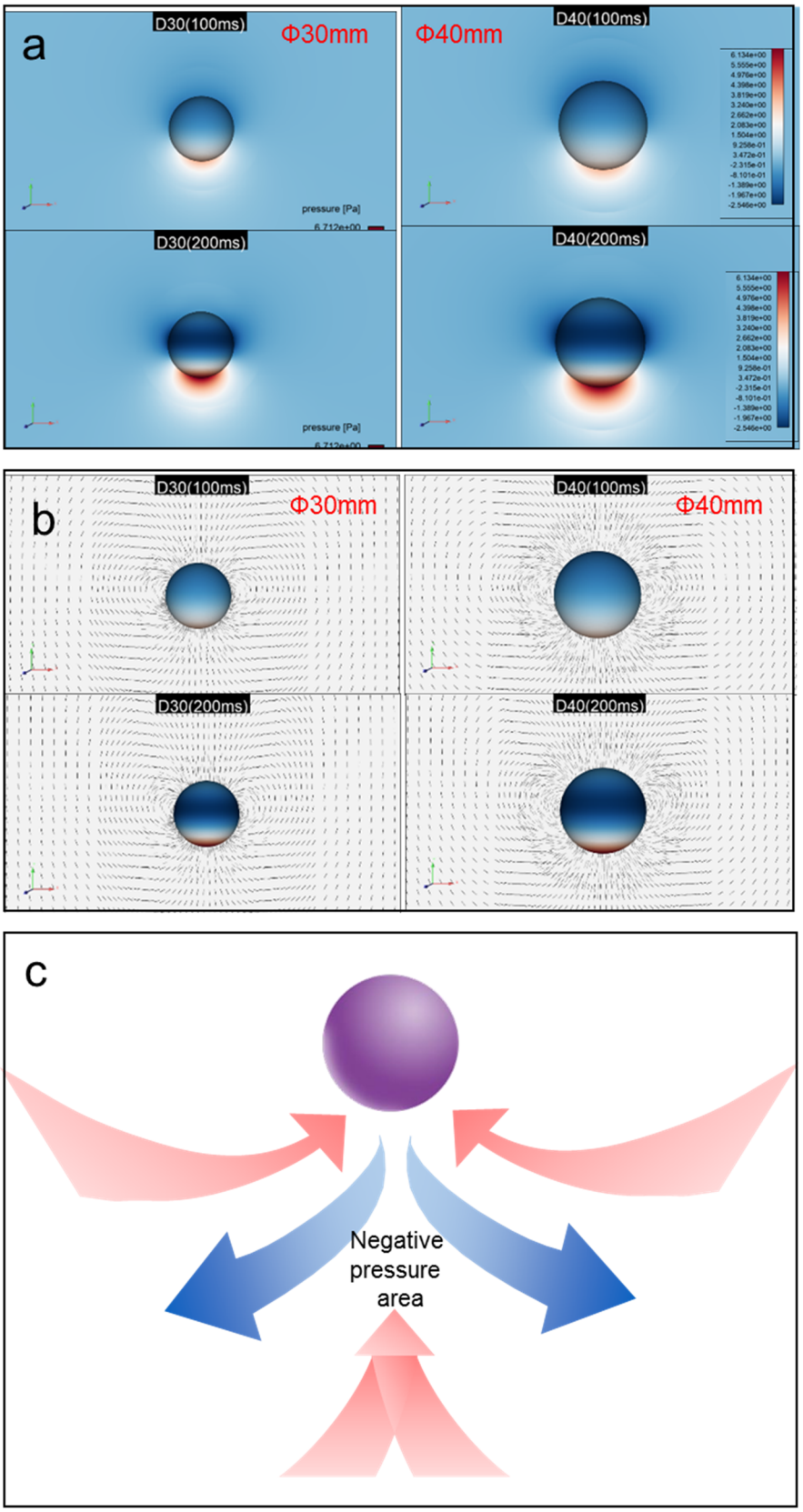


Figure S3. Fluid dynamics simulation between gas and polymers. (a) The pressure between the gas and the polymer surface changes with the contact area. (b) The influence of contact area and velocity on the distribution of gas molecules. (c) The changes of gas pressure around the polymer and the motion trends of gas molecules.