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Depletion induced clustering of red blood cells in microchannels CHRISTIAN WAGNER, MATHIAS BRUST, Experimentalphysik, Saarland University, THOMAS PODGORSKI, GWENNOU COUPIER, Université Grenoble I/CNRS, Laboratoire Interdisciplinaire de Physique — The flow properties of blood are determined by the physical properties of its main constituents, the red blood cells (RBC's). At low shear rates RBC's form aggregates, so called rouleaux. Higher shear rates can break them up and the viscosity of blood shows a shear thinning behavior. The physical origin of the rouleaux formation is not yet fully resolved and there are two competing models available. One predicts that the adhesion is induced by bridging of the plasma (macromolecular) proteins in-between two RBC's. The other is based on the depletion effect and thus predicts the absence of macromolecules in-between the cells of a rouleaux. Recent single cell force measurements by use of an AFM support strongly the depletion model. By varying the concentration of Dextran at different molecular weights we can control the adhesions strength. Measurements at low hematocrit in a microfluidic channel show that the number of size of clusters is determined by the depletion induced adhesion strength.

Christian Wagner
Experimentalphysik, Saarland University

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