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Relative humidity influence on the spreading dynamics of sessile drops of blood DAVID BRUTIN, WASSIM BOUZEID, Aix-Marseille University - IUSTI UMR 7343 — We studied the effect of relative humidity on the initial stages of spreading dynamics for drops of whole human blood. A range of relative humidities from 8% to 90% was studied. Drops of the same volume were gently deposited on ultra-clean microscope glass substrates. We show that the drop spreading is driven by two distinct regimes. The first is characterized by fast dynamics and competition between viscous forces and capillary forces, whereas the second regime is characterized by competition between viscous dissipation and evaporation and exhibits slower dynamics. At early stages of spreading, the power law $r(t) \sim t^n$ ($n = 0.65$) was observed regardless of the humidity. At later stages of spreading, the exponent of the power law $r(t) \sim t^n$ ($n = 0.19$) was found to be higher than that of Tanner's law because of the effect of humidity and Marangoni stresses. Spreading time and spreading dynamics were found to be related to relative humidity. This is explained by the adhesion of red blood cells to the substrate that is similar to the mechanism observed for nanofluid droplets. The mean velocity of the triple line followed the same behavior as Tanner's model, where the final wetting radius and the apparent contact angle are functions of relative humidity.

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