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BLOOD RHEOLOGY ON MODIFIED RHEOMETER SURFACES

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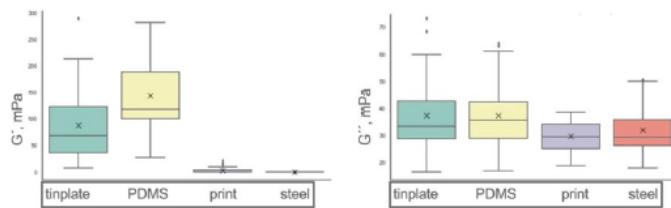
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Fresh blood contains living cells with different extrinsic (size, shape) and intrinsic (deformability, aggregability) properties, which influence the bulk blood flow. The proteins and small molecules in plasma generate a very diverse embedment for these cells by their sizes (from the Angstrom scale (enzymes, factors, hormones) to several tens of nanometers (lipoproteins, ferritin) and by their functions (adhesion, signaling, mechanical coupling). It is evident that such a material has the ability for structuring, adhesive layer formation and phase separation in flow, and cannot be handled as a simple liquid. We show new data on the correlation between plasma proteins, highlighting the importance of this cellular embedment for blood flow.

The fate of such complex physiological liquids in the vicinity of an interface plays a crucial role in multiple situations. Direct contact with blood for long times can produce thrombus formation. High hydrophilic surfaces are beneficial for cell adhesion and growth, whereas high hydrophobic surfaces are considered useful for mobile prostheses (e.g. cardiac valves). Also, the surface morphology of the material in contact plays an important role for the wetting ability with liquids.

Shear moduli (especially G') of whole blood vary substantially if the substrate is changed from classical steel to hydrophobic polydimethylsiloxan-coated plates. The gap dependency and the timely evolution of shear elasticity shows that the liquid is no more homogenous.



This presentation also shows examples how a substrate can modify the blood and plasma behavior under shear, and raises the question, which substrate is the best for the testing of physiological fluids.