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George Karniadakis* (george_karniadakis@brown.edu), Brown University. *Multiscale Modeling of Blood Clotting*

We propose a new multiscale framework that seamlessly integrates four key components of blood clotting namely, blood rheology, cell mechanics, coagulation kinetics and transport of species and platelet adhesive dynamics. We use transport dissipative particle dynamics (tDPD), which is the extended form of original DPD, as the base solver, while a coarsegrained representation of blood cell's membrane accounts for its mechanics. Our results show the dominant effect of blood flow and high Peclet numbers on the reactive transport of the chemical species signifying the importance of membrane bound reactions on the surface of adhered platelets. This new multiscale particle-based methodology helps us probe synergistic mechanisms of thrombus formation, and can open new directions in addressing other biological processes from sub-cellular to macroscopic scales. (Received October 03, 2016)