conferenceseries.com

European Congress on LASER, OPTICS AND PHOTONICS

May 23, 2022 | Webinar

Elastic property of sickle cell anemia and sickle cell trait red blood cells

Horace Crogman
California State University, USA

We introduce a model for better calibration of the trapping force using an equal but oppositely directed drag force acting on a trapped red blood cell (RBC). We demonstrate this approach by studying RBCs' elastic properties from deidentified sickle cell anemia (SCA) and sickle cell trait (SCT) blood samples. A laser trapping (LT) force was formulated and analytically calculated in a cylindrical model. Using this trapping force relative percent difference, the maximum (longitudinal) and minimum (transverse) radius rate and stiffness were used to study the elasticity. The elastic property of SCA and SCT RBCs was analyzed using LT technique with computer controlled piezo-driven stage, in order to trap and stretch the RBCs. For all parameters, the results show that the SCT RBC samples have higher elastic property than the SCA RBCs. The higher rigidity in the SCA cell may be due to the lipid composition of the membrane, which was affected by the cholesterol concentration. By developing a theoretical model for different trapping forces, we have also studied the elasticity of RBCs in SCT (with hemoglobin type HbAS) and in SCA (with hemoglobin type HbSS). The results for the quantities describing the elasticity of the cells consistently showed that the RBCs in the SCT display lower rigidity and higher deformability than the RBCs with SCA.

Biography

Horace Crogman has completed his PhD at the age of 33 years from University of Arkansas and postdoctoral studies from Universite de Bourgogne, Dijon France. He is assistant professer of Physics at California State University, Dominguez Hills,. He has published more than 20 papers in reputed journals and has been serving as an editorial board member of repute.