

Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Drying and precipitation of model respiratory droplets in the perspective of Covid-19 ABHISHEK SAHA, University of California San Diego, PRASENJIT KABI, Indian Institute of Science, SWETAPROVO CHAUDHURI, University of Toronto, SAPTARSHI BASU, Indian Institute of Science — It is now well established that droplets exhaled during respiratory events are carriers of SARS-CoV-2 virus which is responsible for Covid-19 pandemic. To gain fundamental insights into the infectivity of air borne nuclei during such pandemic, we present a study of an isolated nano-colloidal droplet of surrogate mucosalivary fluid. Saltwater solutions containing nanoparticles at reported viral loads are acoustically trapped in contactless environment to emulate the drying, flow and precipitation dynamics of real airborne respiratory droplets. Observations with the surrogate fluid are validated by similar experiments with actual samples from a healthy human subject. A unique feature emerges in the final crystallite dimension; it is always 20-30 % of the initial droplet diameter for different sizes and ambient conditions. Precipitates formed in air trap approximately 15 % of the virions on the substrate while if the same droplet dries on a surface, the fraction of exposed virions increases to approximately 85-90 % (depending on the surface). The letter demonstrates the leveraging of an inert nano-colloidal system to gain insights into an equivalent biological system.

Abhishek Saha
University of California, San Diego

Date submitted: 04 Aug 2020

Electronic form version 1.4