MS39-P04 | SILICA NANOPARTICLE AGGLOMERATION STUDIES UNDER PHYSIOLOGICAL CONDITIONS USING DYNAMICAL SAXS METHODS

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Nanoparticles (NPs) colloidal stability in biological environments is one of the main issues in their biological and medical applications [1,2]. Minor changes in stability and / or the agglomeration state can influence NPs uptake, accumulation, and fate in living systems and accordingly cause some undesired consequences. Although many investigations have been conducted on NPs agglomeration behavior in aqueous biological systems, a systematic and quantitative description of the early stage of NPs agglomeration kinetics has not yet been established. We have developed an in-situ approach based on a combination of small angle X-ray scattering (SAXS) and microfluidics to study these early changes in the nanoparticles size distribution. The generalized indirect Fourier transformation (GIFT) data analysis method has been followed to understand the influence of effective parameters namely ionic strength, pH, and temperature. Using our new method, we can determine the mean agglomeration number for nanoparticles at the very early stages, enabling us to resolve time-dependently the effect of the mentioned various parameters on colloidal stability. To support our results, we have also investigated dynamic light scattering (DLS) and liquid phase transmission electron microscopy (TEM) as two complementary methods and have obtained similar results.

In this contribution, we will present our recent results which identify an appropriate range of different parameters such as ion strength and pH influencing NPs stability. This supports in designing new and safe particle systems for therapeutic and/or theranostics purposes.