

Česká společnost chemická, pobočka Brno

Vás zve na přednášku, která se koná v místnosti 306, budova A11,
Kamenice 5, Přírodovědecké fakulty Masarykovy univerzity, Brno

Ve čtvrtek 14. září 2017 v 13:00 hod.

svůj příspěvek přednese:

Dr. Evgenyi Shalaev

***Heterogeneity of aqueous glasses, and its pharmaceutical
relevance***

Allergan plc, Irvine, CA, USA

Amorphous states are ubiquitous in pharmaceutical and biopharmaceutical products, e.g., solid dispersions of small molecular weight drugs in polymers, freeze-dried proteins, and viral vaccines imbedded into carbohydrate glasses, to name a few. Essentially all amorphous pharmaceuticals are water-based, with water content varying from a fraction of percent w/w (e.g., freeze-dried or spray-dried products) to dilute aqueous solutions. The presentation is focused on structural aspect of amorphous materials, covering two topics: (i) the large-scale (sub-micron) heterogeneity in aqueous glasses, and (ii) the clustering of water molecules in concentrated solutions, which reflects local structure on the sub-nm to nm lengthscale. Potential fundamental and practical significance of different types of heterogeneity are also discussed. It is suggested, for example, that the large-scale heterogeneity is linked with protein destabilization during freezing and freeze-drying. Furthermore, water clustering could be essential in protein solid-state degradation via deamidation reaction, where water clusters assist in the proton transfer step. Finally, the physical chemical basis of freezing of aqueous sugar solutions is reconsidered, and a novel hypothesis is introduced to explain why water-to-ice transformation in typical pharmaceutical solutions is always incomplete.