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Monday–Friday, March 15–19, 2021; Virtual; Time Zone: Central Daylight Time, USA

Session Y12: Physics of Emergent Protein-Complex Assemblies

11:30 AM–2:24 PM, Friday, March 19, 2021

Sponsoring Unit: DBIO

Chair: Andrei Gasic, University of Houston; Margaret Cheung, University of Houston

Abstract: Y12.00004 : Protein Aggregation *in vivo*: Stochasticity and the Method of Second Stochastization*

12:24 PM–12:36 PM Live

← Abstract →

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The nucleation and growth of protein aggregates are important both to understanding both the structure of the cell's membraneless organelles and the pathogenesis of many diseases. The intrinsically stochastic nature of the aggregation process challenges our theoretical and computational abilities. To explore the mechanistic details of the stochastic aggregation process more efficiently, we explore a new approach to stochastic aggregation kinetics based on accompanying noise in averaged equations based on mathematical moment closure schemes. Stochastic moment equations cope with the large diversity of species while taking into account the stochastic fluctuations accompanying both primary and secondary nucleation as well as aggregate growth, dissociation, and fragmentation. This method of "second stochastization" works well in the regime of moderate fluctuation often encountered *in vivo* where $N \sim O(10^2 - 10^3)$. Simulations reveal a scaling law that correlates the size of fluctuation with the total number of monomers. We believe second stochastization schemes will prove valuable for bridging the gap between experiments and theoretical modeling.

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