Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Surfaces Self-Assembly and Rapid Growth of Amyloid Fibrils[1]
YICHIH LIN, E. JAMES PETERSSON, ZAHRA FAKHRAAI, Univ of Pennsylvania — The mechanism of surface-mediated fibrillization has been considered as a key issue in understanding the origins of the neurodegenerative diseases, such as Alzheimer's and Parkinson's diseases. *In vitro*, amyloid proteins fold through nucleation-elongation process. There is a critical concentration for early nucleating stage. However, some studies indicate that surfaces can modulate the fibril's formation under physiological conditions, even when the concentration is much lower than the critical concentration. Here, we use a label-free procedure to monitor the growth of fibrils across many length scales. We show that near a surface, the fibrillization process appears to bypass the nucleation step and fibrils grow through a self-assembly mechanism instead. We control and measure the pre-fibrillar morphology at different stages of this process on various surfaces. The interplay between the surface concentration and diffusion constant can help identify the detailed mechanisms of surface-mediated fibril growth, which remains largely unexplored. Our works provide a new insight in designing new probes and therapies.

[1]Supported by the National Institute On Aging of the National Institutes of Health under Award Number P30AG010124.

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Date submitted: 12 Nov 2013 Electronic form version 1.4