MAR12-2011-009064

Abstract for an Invited Paper
for the MAR12 Meeting of
the American Physical Society

The Physics of Amyloid Aggregation and Templating in Prions[1]

DANIEL COX, Dept. of Physics, UC Davis

The problem of self-assembled amyloid aggregation of proteins in structures with beta-strands perpendicular to a one dimensional grown axis is interesting at a fundamental level (is this the most generic end state of proteins?), from a biological level (if the self-assembly can be regulated it is of use in contexts like spider silk and bacterial colony formation), for human public health (aggregation unregulated induces diseases like mad cow and Alzheimer's), and for possible materials applications (e.g., in tissue scaffolding). In this presentation, I will review the work of my group in examining the possibility that the left-handed beta helix (LHBH) structure can be the building block of the aggregates of mammalian prion and yeast prion proteins. I will also discuss our efforts to assess the possibility of a novel pH driven structural switch between LHBH and alpha-helical forms in the ordered half of the mammalian prion protein, and now the possibly pH stabilized LHBH structure can template aggregate growth of the disordered half of the protein, identified in numerous experimental studies as most relevant to disease.

[1]Support from US NSF I2CAM International Materials Institute Award, Grant DMR-0844115 is gratefully acknowledged