Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Membrane-associated folding and unfolding YANA RESHETNYAK, ALEXANDER KARABADZHAK, DHAMMIKA WEERAKKODY, MAK THAKUR, Physics Department, URI, GREGORY ANDREEV, Physics Departmenr, UCSD, DONALD ENGELMAN, Mol. Biophys Biochem., Yale Univ., OLEG ANDREEV, Physics Department, URI — We are studying the molecular events that occur when a peptide inserts across a membrane or exits from it. Using pH jumps to trigger insertion/exit of the pHLIP (pH Low Insertion Peptide) to enable kinetic analysis, we show that insertion occurs in several steps, with rapid (0.1 sec) interfacial helix formation followed by a much slower (100 sec) insertion pathway to form a transmembrane helix. The reverse process of unfolding and peptide exit from the bilayer core, which can be induced by a rapid pH jump from acidic to basic, proceeds much faster than folding/insertion and through different intermediate states. In the exit pathway, the helix-coil transition is initiated while the polypeptide is still inside the membrane. We also designed two pHLIP-variants where Asp and Glu residues were removed from the C-terminus, which inserts across the membrane. The variants preserve the same pH-dependent properties of pHLIP peptide interaction with the membrane, but insertion occurs 10-30 times faster than in the case of the parent pHLIP peptide. A kinetic model of peptide-membrane insertion/folding and exit/unfolding will be discussed. The work was supported by grant from the NIH RO1133890 to OAA, DME, YRK.

Yana Reshetnyak
Physics Department, URI

Date submitted: 04 Nov 2009 Electronic form version 1.4