Abstract Submitted
for the NWS14 Meeting of
The American Physical Society

Theoretical studies of asymmetric, multicomponent, lipid bilayers
HA GIANG, MICHAEL SCHICK, Univ of Washington — We consider an asymmetric bilayer in which the two leaves are coupled solely by the fact that cholesterol can go back and forth between them rapidly. To model this, we require that the chemical potential of cholesterol in the two leaves be the same, and this provides the coupling. We examine two problems. First we consider how the transition temperature in one leaf is affected by the distribution of lipids in the other. In particular, we show that if the lipids are distributed very asymmetrically, as they are in the mammalian plasma membrane, phase separation can occur in one leaf and not the other. Secondly we consider the distribution of cholesterol in the bilayer. It is widely accepted that sphingomyelin has the greatest affinity for cholesterol. After that, the order of preference is phosphatidylserine, phosphatidylcholine, and lastly phosphatidylethanolamine. We show that, in spite of the affinity of cholesterol for sphingomyelin, which is located predominantly in the outer leaf of the plasma membrane, it is possible to have a majority of the cholesterol in the inner leaf. This situation has been observed in experiments on Chinese hamster ovary cells in which 70 percent of cholesterol was found in the inner leaf.

Ha Giang
Univ of Washington

Date submitted: 20 Mar 2014 Electronic form version 1.4