Many biomaterials are designed to regulate the interactions between artificial and natural surfaces. However, when materials are inserted through the cell membrane itself, the interface formed between the interior edge of the membrane and the material surface is not well understood and poorly controlled. By replicating the nanometer-scale hydrophilic-hydrophobic-hydrophilic architecture of transmembrane proteins, artificial “stealth” probes spontaneously insert and anchor within the lipid bilayer core, forming a high-strength interface. Hydrophobically functionalized probes naturally resided within the lipid core, while hydrophilic probes remained in the aqueous region. These results highlight a new strategy for designing artificial cell interfaces that can nondestructively penetrate the lipid bilayer.

(A). Surface-surface interactions regulated by tethering molecules to the substrate. (B) The “stealth probe” structure with a hydrophobic domain designed to interact specifically with the hydrophobic membrane core through selective surface functionalization. (C) A functionalized band several nanometers thick is defined by selective self-assembly of molecules. (D) A hydrophobic functionalized band interacts specifically with the hydrophobic core of the lipid bilayer, similar to the behavior of membrane proteins.

REFERENCE:
“Fusion Of Biomimetic Stealth Probes Into Lipid Bilayer Cores”