Analytical study of the adhering of a small spherical particle to a vesicle

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(Dated: May 18, 2012)

The particle binding to the lipid bilayer is found in many real biological systems, such as the virus infection, the endocytosis and the exocytose. Based on the spontaneous curvature model we give the deformation energy of a vesicle induced by an attached small spherical particle from an integral of contact line condition. From the spatial gradient of the deformation energy we give the binding site of the membrane, which for a pure lipid bilayer is the most concave position on the membrane looking from the particle¡¯s side of the membrane. We also show that our analytical result perfectly fits our previous numerical result when the size constraint is taken into consideration.

PACS numbers: 87.16.Dg, 46.70.Hg, 68.03.Cd, 87.17.Aa