

Quantification of host-guest interaction using a surface forces apparatus

박진태, 박진우, 임찬웅, 이동욱[†]

UNIST

(dongwoog.lee@unist.ac.kr[†])

The host-guest (H-G) interaction has been widely used to the biomedical areas such as hydrogel, bio-glue, and drug delivery. Especially, the H-G complex of cyclodextrin (CD) with adamantane (Ad) are emerging due to their compatibility in biological system. Despite the considerable interests, the relation of forces to thermodynamic energy of H-G complexes still remain ambiguous. Herein, we directly measured the interaction between CD and ditopic Ad (*di*-Ad) molecule in aqueous solution using a surface forces apparatus (SFA) depending on the cavity size of CD and the concentration of *di*-Ad. The adhesion forces were measured only between the β -CD in presence of *di*-Ad, which showed a drastic increase with increasing the concentration of *di*-Ad and gradually decreased after reaching complete H-G complex. Furthermore, a quartz crystal microbalance with dissipation (QCM-D) monitoring was used to convert the adhesion force to a single molecular interaction energy of β -CD with *di*-Ad ($\sim 10 k_B T$), which was comparable to previous experimental and theoretical studies. This findings demonstrate the direct correlation between the adhesive force and thermodynamic energy of H-G complexes.