

Measurements of dipole strength of colloids trapped at a curved oil–water interface

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We report the measurements of dipole strength (or intrinsic potentials) of charged colloidal particles at a curved oil–water interface. To do this, we perform experiments based on the oil lens system and analyses using MC simulations. In order to measure the intrinsic potentials of three particles (a_1 , a_2 , a_3), for instance, three independent conditions should be required. One condition can be the pair interaction (a_{12}) between particle-1 and -2 in the presence of the two particles at the curved oil–water interface. Another condition can be determined in the triangular structure of three particles (r_1 , r_2 , and r_3) upon adding the third particle to the interface. The other condition should correspond to the minimum energy of the triangular structure (E_{\min}). Consequently, the three unknown variables (a_1 , a_2 , a_3) can be solved by these three independent conditions. This approach for determining the intrinsic potentials can potentially clarify the physical meaning of the intrinsic potentials (i.e., dipole strength) of colloids trapped at fluid–fluid interfaces.