Interaction of sols on a dispersion containing only the counterions dissociated from the surface
Bo-Tau Liu, Wei-De Yeh
National Yunlin University of Science and Technology, Chemical and Materials Engineering, 123 University Road, Section 3, Douliou, Yunlin 64002, Taiwan, R.O.C., Yunlin, Taiwan, 64002, Taiwan, E-mail: liubo@yuntech.tw

The electrical potential for the case of two identical, planar parallel sols immersed in a salt-free medium, where the ionic species is the counterions come solely from that dissociated from the surfaces, is evaluated. We show that in a salt-free dispersion if the separation distance between two sols is sufficiently far, the electrical repulsive force dominates, that is, the total energy is positive and does not have a secondary minimum, which is not the case for a dispersion where both coions and counterions are present. Also, the conditions used to calculate the critical coagulation concentration in the classic DLVO (Derjaguin, Landau, Verwey, and Overbeek) theory become inappropriate and Derjaguin approximation is inapplicable. We show that if the surface charge density exceeds ca. 0.04 C/m², the stability of a salt-free dispersion remains essentially the same. If the surface charge density is sufficiently high, the maximum separation distance between two particles below which coagulation occurs is in the range [0.1 nm] and [1.7 nm] for the case where Hamaker constant are 10⁻⁸-20 J and 10⁻¹⁹ J, respectively.

Keywords: salt-free dispersion, Posisson-Boltzmann equation, stability

Construction of 2 helical assemblies of fluorescent molecules and the study on their properties
Yohei Morishita, Ichiro Hisaki, Norimitsu Tohnai, Mikiji Miyata
Division of Advanced Science and Biotechnology, Graduate School of Engineering, Osaka University, Department of Material and Life Science, 2-1, Yamadaoka, Suita-City, Osaka, 565-0871, Japan, E-mail: morishita@moltrec.mls.eng.osaka-u.ac.jp

2 helical assemblies are often found and general in crystals. Conventionally, it has been assumed that right- or left-handedness of 2 helical assemblies cannot be determined on the basis of mathematical viewpoint, because the two-fold screw axis operation includes just 180 degrees rotation and translation. We had, however, been aware of that those can be chiral when the objects consisting of themselves are not spherically-symmetric. Recently, we have suggested that it is possible to define the handedness of 2 helical aggregates observed in crystals on the basis of the molecular tilt against the 2 axis. In this study, we prepared the crystals in which fluorescent molecules form 2 helical assemblies. Namely, crystallization of 9 fluorenone-2-carboxylic acid (9F2CA) and chiral amines yielded homo-chiral 2 helical structures (Figure). We determined the handedness of the 2 helical assemblies on the basis of...