Surface charge of ceria and related rare earth oxide powders in water

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The surface charge of cerium oxides and related rare earth oxides in water was measured. Ultrasonic vibration potential method was applied to determine the surface charge density and its pH dependence. Sonic irradiation at 250kHz induced an alternative current in suspensions with a certain wave length. The observed potential largely varied, depending on the surface charge density of composite powders, for suspensions at different pH as well as the composition of ceria and alumina. The paper described the detailed measurement on pH dependence, the effect of coexisting ions and pH swing. The zero charge point (pH of zero charge on powers in water) strongly depended on surface segregated composition. For a series of ceria alumina composite powders, the dependence of surface composition from XPS measurement can be observed, however the distinguish feature was the difference trivalent rare earth metal oxides and tetravalent Ce oxide. The zero charge point of CeO2 was ca.7, while those of composite powders were at 8-9. The relationship of the zero charge point and surface segregation must be discussed.