

عنوان مقاله:

Preparation of γ -Al₂O₃ and Prioritization of Affecting Factors on the Crystallite Size Using Taguchi Method

محل انتشار:

مجله چالش های نانو و مقیاس خرد در علوم و فناوری، دوره 1، شماره 1 (سال: 1392)

تعداد صفحات اصل مقاله: 8

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خلاصه مقاله:

In this work, boehmite sol was prepared by a previously applied and validated method; hydrolysis of aluminum chloride hexa-hydrate. In order to obtain precise results, the effect of pH after adding precipitating agent, aging time, peptizing temperature and ultrasonic vibration time on the crystallite size of final precipitate were investigated in a narrow range. The preparation conditions applied in the production step of nanocrystalline boehmite affected on the desired alumina phase. Experiments were set based on the statistical design of experiments (Taguchi method). Furthermore the influence of calcination on crystallization and phase transformation of the precipitate was investigated using X-ray diffractometry (XRD) and simultaneous thermal analysis (STA) techniques. To evaluate the results, the obtained data were statistically analyzed. Considering the statistical analysis of experiments, the pH after adding precipitating agent is the major parameter affecting crystallite size. In contrast, aging time has the smallest effect on the crystallite size. In addition, Transmission electron microscopy (TEM) of the samples revealed that the particle size of the powders was well distributed in the nano-size range. Taguchi prediction on the crystallite size was 2.096 ± 0.139 nm (with confidence interval of 95%) which confirmed by a verification experiment (2.064 nm).

کلمات کلیدی:

Boehmite, γ -alumina, Precipitation, aging time, ultrasonic vibration, Experimental design

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