206 Nanostructuring of sodium titanosilicate by hydrothermal method

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Inorganic materials with tunnel structures have attracted attention for encapsulating a variety of ions by exchanger [1-2]. The titanosilicate framework structure, consisting of cavities and tunnels, has proved to be useful for the treatment of nuclear waste solutions [3-4]. Sodium titanosilicate $Na_2Ti_2O_3(SiO_4)•2H_2O$ (ST) can be synthesized hydrothermally, being its cristallinity a function of concentration of NaOH [3]. In this work, we explored the nanostructuration of this sodium titanosilicate phase in order to improved the superficial area of the product thus increasing its, efficiency as ion exchanger.

In this study, ST nanostructured was prepared by hydrothermal synthesis using polycrystalline silicon and anatase as titanium source; an organic surfactant, hexadecylamine HDA, was added in order to control the size and morphology of the phase. After hydrothemal treatment, the sample was collected by centrifugation, washed with a solution of HCl (1N) until neutral pH, and water; the obtained white powder was dried at 70◦C.

The powder X-ray of the crystalline sample corresponds well to that of $Na_2Ti_2O_3SiO_4 • 2H_2O$ with the characteristic peak at 7.8 Å (JCPDS 00-047-0591). Presence of alkylamine appears not to affect the crystal structure of the phase.

TEM image of as synthetized sample is showed in the Fig. 1. Nanorods with aspect average ratio 1:4 were observed. This morphology was corroborated by SEM studies. The surfactant effect allowed moderate the synthesis conditions; moreover limits the size of particles to nanometric dimensions, and homogenized the shape, without changing the crystalline phase of sodium titanosilicate.

In summary, we have obtained $Na_2Ti_2O_3(SiO_4)•2H_2O$ with a new morphology, --nanorods-- and under relatively soft conditions in a process induced by the presence of a surfactant.

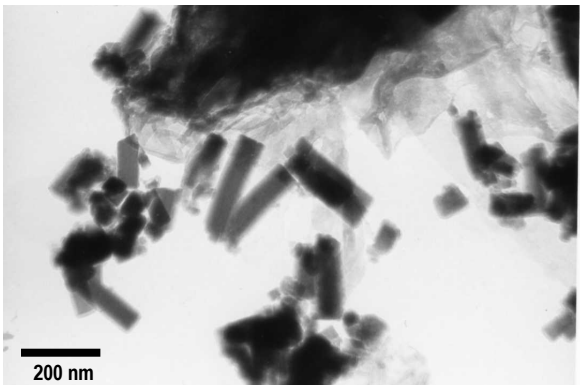

Figure 1. *The micrograph of transmition electron microscopy of the nanocomposites syntetized.*

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References

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