Toward complex nanoarchitectures: assemblies of nanoparticles of metal oxides – matrices of LDH anionic clays



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Matrices of LDHs anionic clays



-specific acid base properties

-redox characteristics

- biocompatibility

-high exchange capacity

- porous properties and nanotexture
- high surface area

 $[\mathbf{M}^{II}_{1-x}\mathbf{M}^{III}_{-x}(\mathbf{OH})_2]^{x*} [\mathbf{A}^{m*}_{-x/m} \cdot \mathbf{nH}_2\mathbf{O}]^{x*}$

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Anionic clay memory effect



Layered structure is destroyed by thermal treatment but can be reconstructed by treatment with solutions containing anions



Nanoparticles of Metals Oxides



Nanosized metal oxides – specific properties within nanorange different from that of the bulk structure

Within nanorange the metal oxides particles aggregate and alter their properties from nano to micro and macro range

Nanostructured Assembling:

- joins the textural features of the components

✓
→ complex nanoarchitectures
- joins the properties of the components
↓
nanostructures with complex properties

-reduce the aggregation process within nanorange

Carja, Kameshima, Okada, Journal of Nanoscience and Nanotechnology vol. 9. no.1-5, 2009.



XRD and SEM analysis







Carja, Niiyama, Nakamura, Micropor. Mesopor. Mater. 2007, 47, 275.

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TEM analysis



Carja, Kameshima, Okada, Microp. Mesopor. Mater. 115 (2008), 541.

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TEM analysis





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XPS analysis



Conclusions

1. We obtained new materials that joins the properties of anionic clay matrices and that of nanosized metal oxides.

2. These materials own interesting optical, magnetical and catalytic properties and a show a good stability of their textural characteristics within nanorange.