SYNTHESIS AND CHARACTERIZATION OF 3D MESOPOROUS TRANSIENT METAL OXIDE FOR HIGH-PERFORMANCE CATALYSTS

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Different 3D mesoporous oxide materials (SiO_2 – KIT-6, MCF-17, SBA-15, Co_3O_4, MnO_2, Fe_2O_3, NiO, CeO_2) prepared by the soft and hard template (replica) method due to the fact that the usage of the 3D mesoporous oxide supports with high specific surface area has great influence on the catalytic activity and selectivity (e.g. Co_3O_4 supported catalyst is 10 times more active compared to the SiO_2 supported Pt.).

The synthesis of KIT-6 is as follows: P123 (Pluronic-123) was homogenized in deionized water and cc. HCl and then butyl alcohol was added. This mixture was stirred for 1 hour at 35 ^{0}C. After 1 hour we were poured 58g TEOS (Tetraethyl orthosilicate) and stirred for 24 hours. After the material was dried we were filtered. The next day was calcined at 550 ^{0}C for 6 hours.

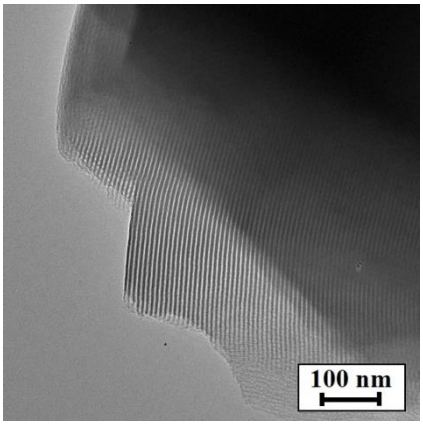

Fig. 1. TEM images of KIT-6

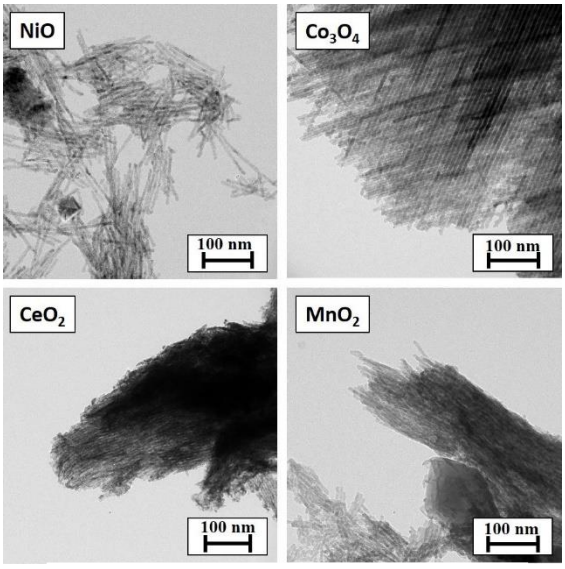

Fig. 2. TEM images of NiO (A), Co_3O_4 (B), CeO_2 (C), MnO_2 (D)

Furthermore Co_3O_4, MnO_2, Fe_2O_3, NiO, CeO_2 mesoporous oxide carriers were prepared. For the synthesis metal-nitrate was dissolved in deionized water. The prepared mesoporous KIT-6 silica were dissolved in toluene and all of it was stirred at 65 ^{0}C. The material was dried at 60 °C overnight then it was calcined at 300 °C for 6 hours. After the silica template was removed with NaOH solution and we were washed several times with deionized water and dried.

The synthesis of these mesoporous oxide carriers were successful and had large surface area. This fact was supported by TEM, BET and XRD monitoring prove.