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Supplementary material

Facile Synthesis of Highly Thermostable Mesoporous $ZnAl_2O_4$ with Adjustable Pore Size

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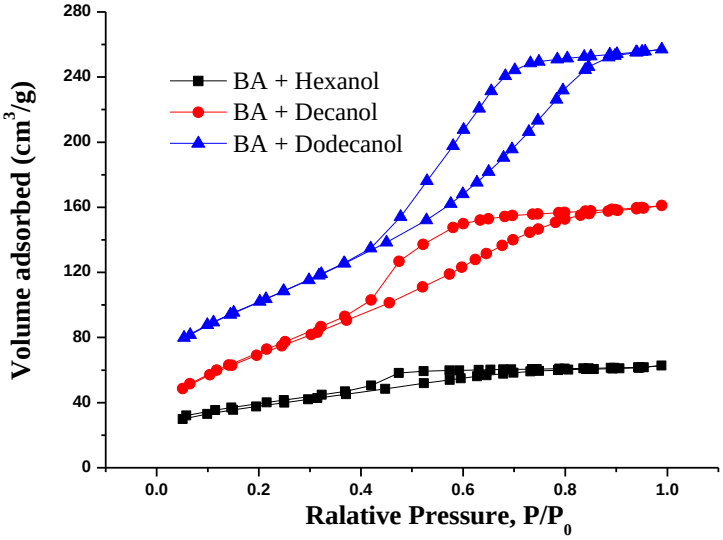

Figure S1 N_2 adsorption-desorption isotherms of $ZnAl_2O_4$ spinel precursors prepared with different mixed structure directing agents.

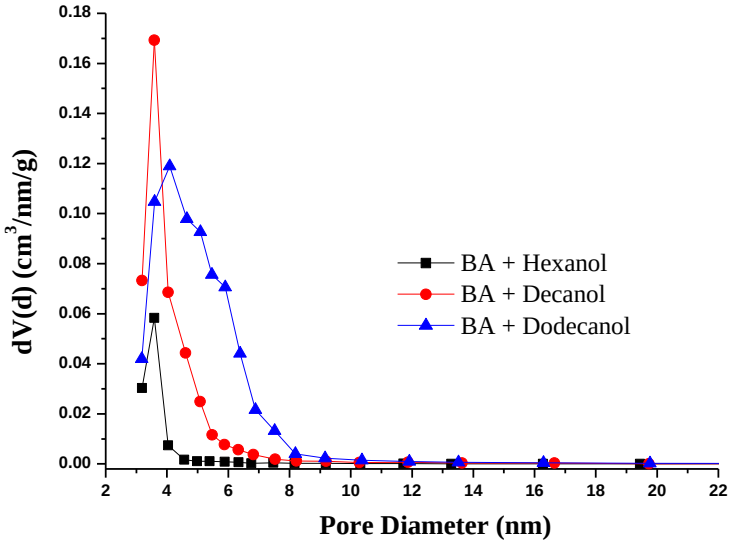

Figure S2 BJH pore size distribution curves of the $ZnAl_2O_4$ spinel precursors prepared with different mixedstructure directing reagents.

Table S1 Texture parameters of the $ZnAl_2O_4$ spinel precursors prepared with different mixed templates.

structure directing reagents	**Surface area (m^2g^{-1})**	**BJH pore size (nm)**	**Pore volume (cm^3g^{-1})**
BA + Hexanol	103.3	3.5	0.08
BA + Decanol	253.4	3.6	0.26
BA + Dodecanol	278.8	4.1	0.35

As it depicted in Figure S1, N_2 adsorption-desorption isotherms of all the three $ZnAl_2O_4$ precursors can be identified as type IV adsorption curve and type H2 hysteresis, which indiacted the mesoporous structure of the precursors, and its BJH pore size distributions is shown in Figure S2. Texture parameters of all the precursor prepared with different mixed structure directing reagents are shown in Table S1. We can find that all the results of $\boldsymbol{S}_{BET}$, $\boldsymbol{D}_p$ and $\boldsymbol{V}_t$ enlarged with increasing the carbon chain. Specially, for the sample prepared with BA and hexanol, the value of $\boldsymbol{S}_{BET}$ and $\boldsymbol{V}_t$ of precursor is much lower than its calcinated at 500 °C. However, for the other two samples, this difference is very small, which is probably because of the pore diameter for sample prepared with BA and hexanol is very small (3-4 nm and maybe smaller) and result in the templates existed in the pore cannot be removed when the precursor is rinsed with water and ethanol, however for the samples prepared with decanol and dodecanol the pore size is comparatively large, up to 3.5-5 nm and 4-7nm respectivly, and the existed organics is easier to be removed.

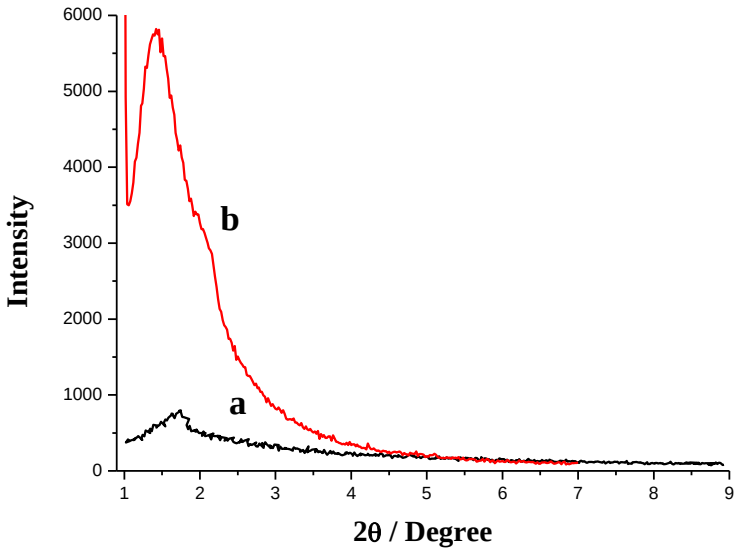

Figure S3 Low angle XRD results of samples prepared with mixed template of BA and n-hexanol, a) precursor; b) calcinated at 500 °C.

Small angle XRD results are shown in Figure S3, two diffraction peaks centered at 2θ = 1.72° and 1.44° for the precursor sample prepared with mixed agent of BA and hexanol before and after calcinating at 500 °C can be found respectively, which indicated the mesoporous structures of both samples. Furthermore, the 2 θ degree of diffraction peak emerged for the precursor is higher than that after calcinating at 500 °C, which means d-value for the precursor is lower and this trend is the same with the results of N_2 adsorption-desorption.