Electronic Supplementary Material (ESI) for RSC Advances.
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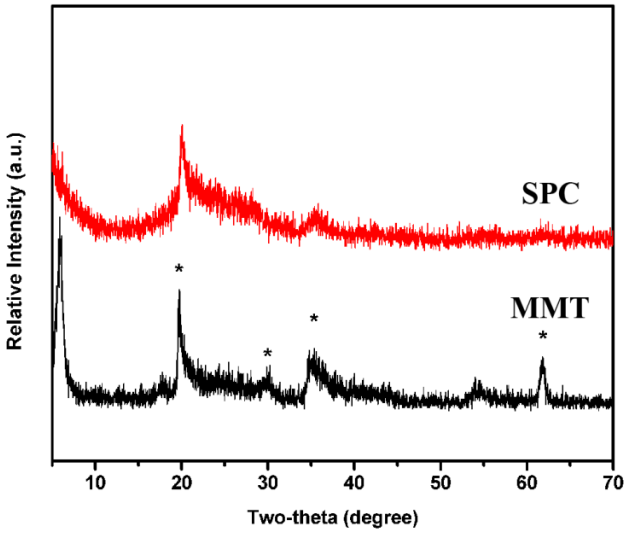


**Fig.1S Wide angle XRD patterns of SPC and MMT.**

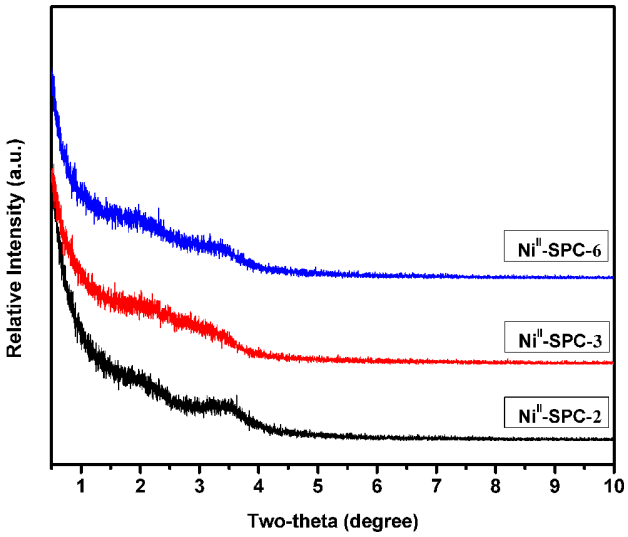


**Fig.2S Low angle XRD patterns of $Ni^{II}$-SPCs.**

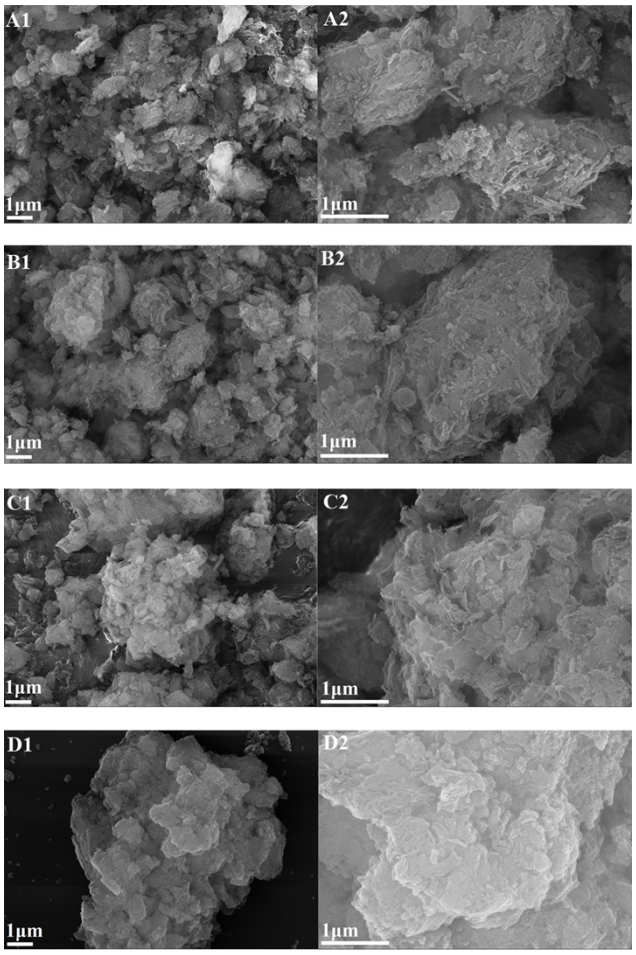


**Fig.3S SEM images of the compared samples: (A) $Ni^0$/SPC-6, (B) $Ni^0$/SPC-3, (C) $Ni^0$/SPC-2, (D) SPC.**

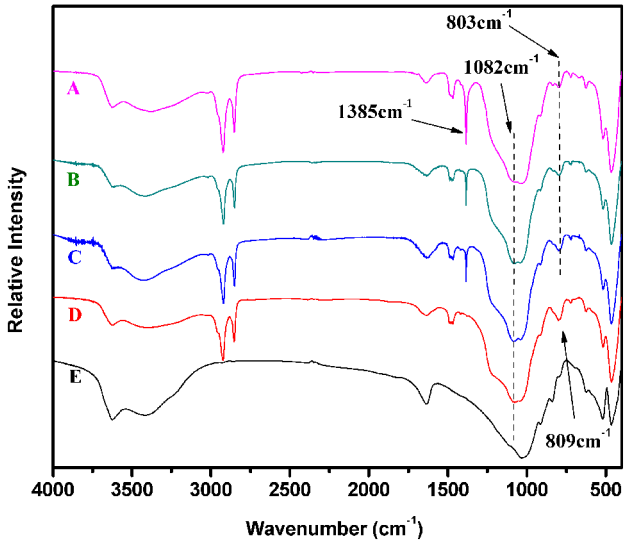


**Fig.4S FTIR patterns for (A) $Ni^{II}$-SPC-6, (B) $Ni^{II}$-SPC-3, (C) $Ni^{II}$-SPC-2, (D) SPC, (E) MMT.**

Fig. 4S shows the FTIR spectra of the products in the range of 4000 - 450 $cm^{-1}$. The strong and wide bands around 1200 - 1000 $cm^{-1}$ are associated to the asymmetric Si–O stretching modes. The $Ni^{II}$-SPCs and SPC have the much sharper bands at 1082 $cm^{-1}$ than natural montmorillonite, this suggests that the crystallinity of the particles increased and the particles became more compact.[32]

The characteristic band of Si-O-Si in 809 $cm^{-1}$ could be observed for SPC. However, the band of $Ni^{II}$-SPCs at 809 $cm^{-1}$ has a slight red-shift to 803 $cm^{-1}$. This may have been due to an interaction between the nickel atoms and silicon (forming Ni-O-Si bonds)[40,42]. And these results indicate that there is silica structure had been planted into the interlayer of clay. Moreover, a strong sharp band at 1385 $cm^{-1}$ exists at the FTIR spectra of $Ni^{II}$-SPC-6, $Ni^{II}$-SPC-3 and $Ni^{II}$-SPC-2. With the incorporation of Ni (II) into the gallery silica framework, the intensity of 1385 $cm^{-1}$ bands increase with the increase of molar of nickel nitrate hexahydrate ammonia solution during graft process. Furthermore, the intensity of the band at 1385 $cm^{-1}$ increases with the nickel content increases, which is usually taken as proof of the Ni–O–Si in the gallery frame structure.

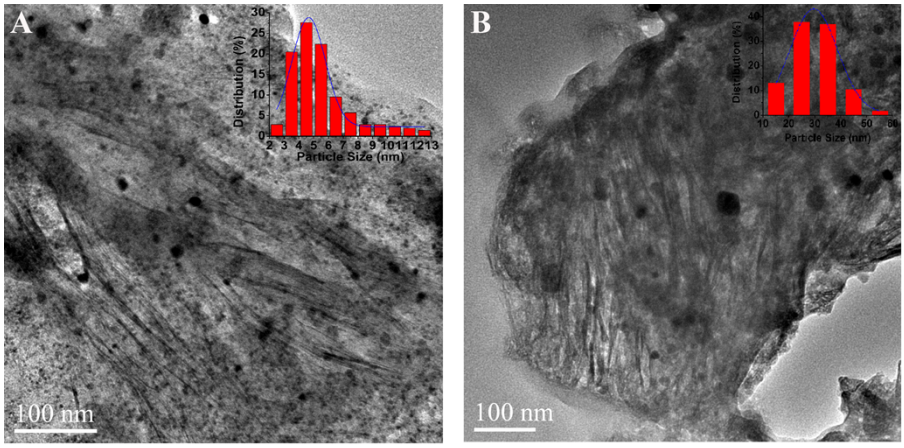


**Fig. 5S TEM images of (A) $Ni^0$-SPC-6 and (B) $Ni^0$/SPC-6 after five times of catalytic reaction, respectively.**