Electronic supplementary information (ESI) available

Development and Functionalization of Magnetic Nanoparticles as Stable and Reusable Catalyst for Triacetin Synthesis

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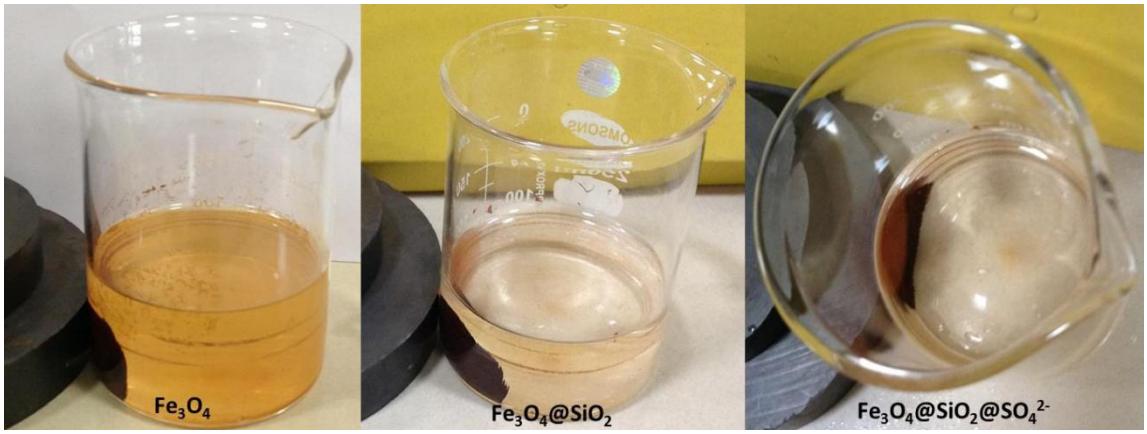

Fig. ESI-1. Magnetic separation with external magnet during preparation of magnetic catalyst.

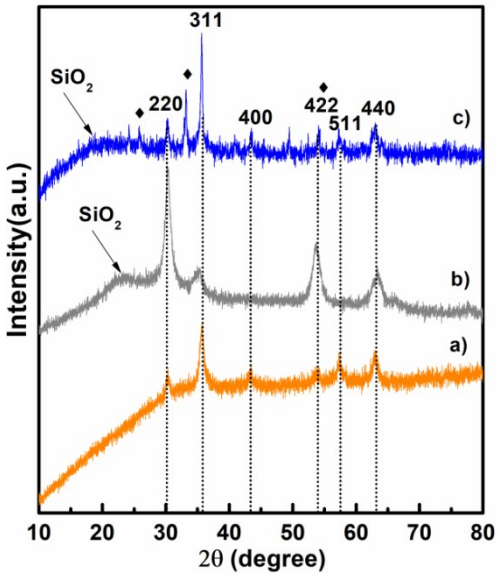

Fig. ESI-2. X-ray diffraction patterns of (a) Fe_3O_4, (b) $Fe_3O_4@SiO_2$ and (c) $Fe_3O_4@SiO_2@SO_4^{2-}$. (♦- $Fe_2(SO_4)_3$).

Table ESI-1. Comparison of the BET specific surface area, pore volume and pore diameter of the magnetic catalysts.

Catalyst	BET (m^2/g)	Pore volume (cm^3/g)	Pore diameter (nm)	Total acidity ($mmol.\ g^{-1}$)
Fe_3O_4	128.85	0.55	10.6	0.32
$Fe_3O_4@SiO_2$	-	-	-	1.27
$Fe_3O_4@SiO_2@SO_4^{2-}$	69.00	0.30	9.23	8.63

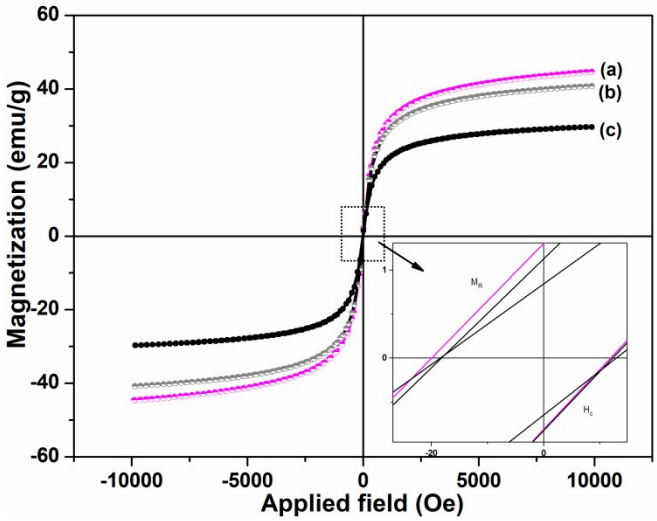

Fig. ESI-3. Magnetization curves of (a) Fe_3O_4, (b) $Fe_3O_4@SiO_2$ and (c) $Fe_3O_4@SiO_2@SO_4^{2-}$.

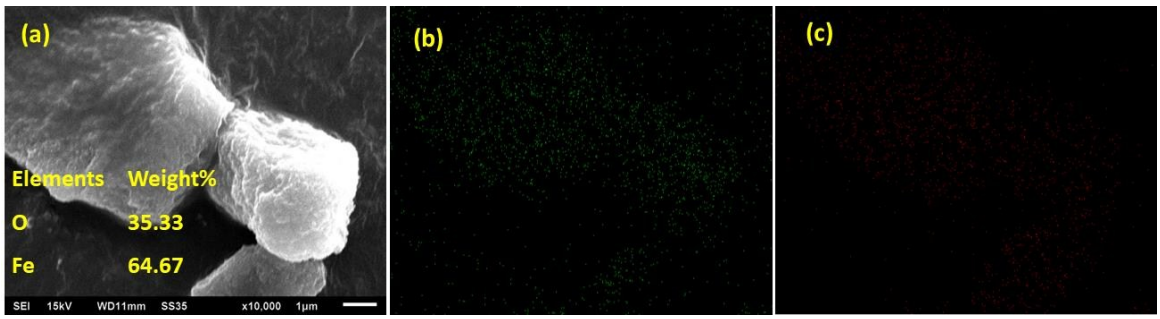

Fig. ESI-4. SEM image of (a) Fe_3O_4 and colour mapping of (b) O and (c) Fe.

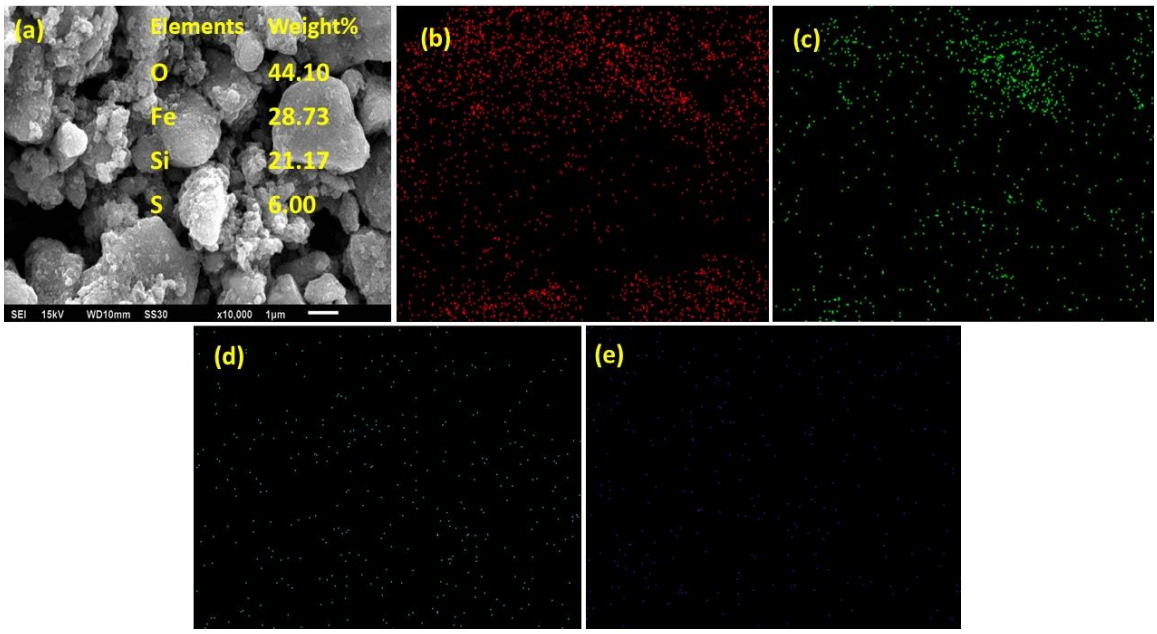

Fig. ESI-5. SEM image of (a) $Fe_3O_4@SiO_2@SO_4^{2-}$ and colour mapping of (b) O, (c) Fe, (d) Si and (e) S.

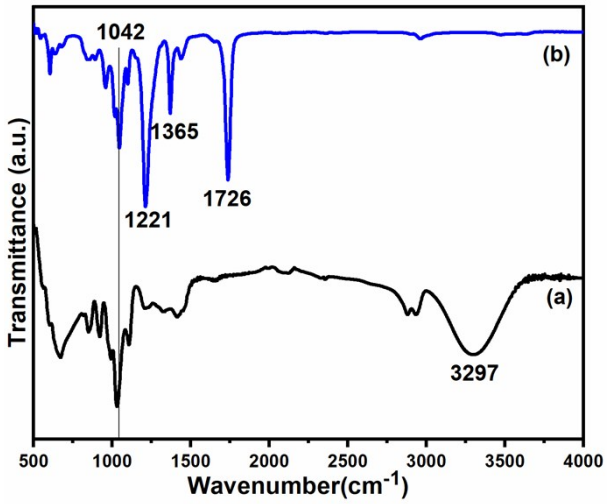

Fig. ESI-6. FT-IR spectra of (a) glycerol, and (b) triacetin.

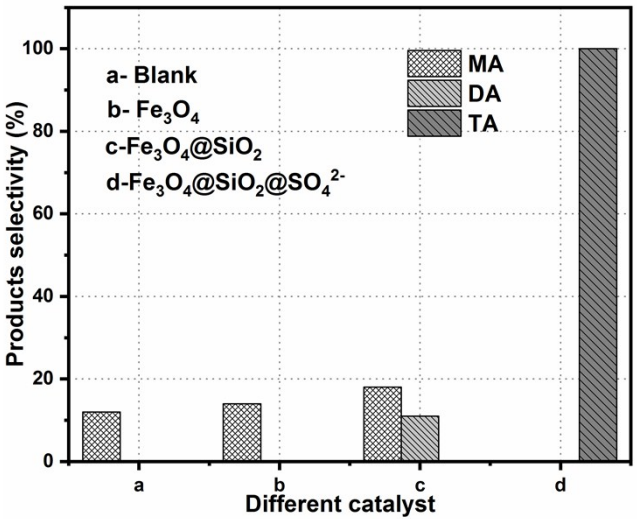

Fig. ESI-7. Effect of the various catalysts over the esterification of GL under the optimized reaction conditions:- AcA to GL 6:1, catalyst wt% 5, reaction temperature 80 °C and reaction time 45 min.

Table ESI-2. Comparison of the EDS data and other physical parameters **c**oercivity (H_C), retentively (M_R) and saturation magnetization (M_S) of the fresh and regenerated magnetic catalysts.

Element →	**S (Wt%)**	**Physical parameters**		
		H_C (G)	**M_R (emu/g)**	**M_S (emu/g)**
Fresh catalyst	6.0	15.0	0.7	30.0
Regenerated catalyst	1.7	44.0	0.09	2.0