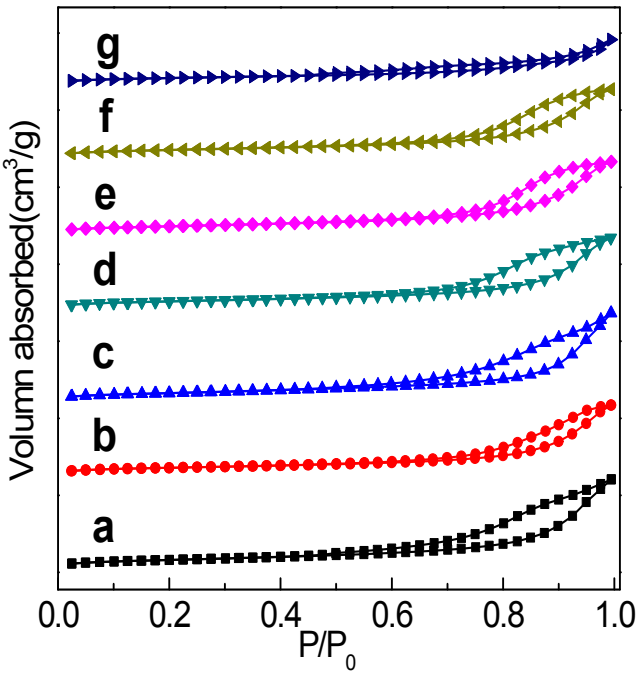

Fig.S1. N_2 adsorption/desorption isotherms for Ce-doped Mg-Al mixed oxides: (a) Mg_3Al, (b) $Mg_3Al_{0.97}Ce_{0.03}$, (c) $Mg_3Al_{0.94}Ce_{0.06}$, (d) $Mg_3Al_{0.9}Ce_{0.1}$, (e) $Mg_3Al_{0.85}Ce_{0.15}$, (f) $Mg_3Al_{0.8}Ce_{0.2}$, (g)$Mg_3Al_{0.6}Ce_{0.4}$

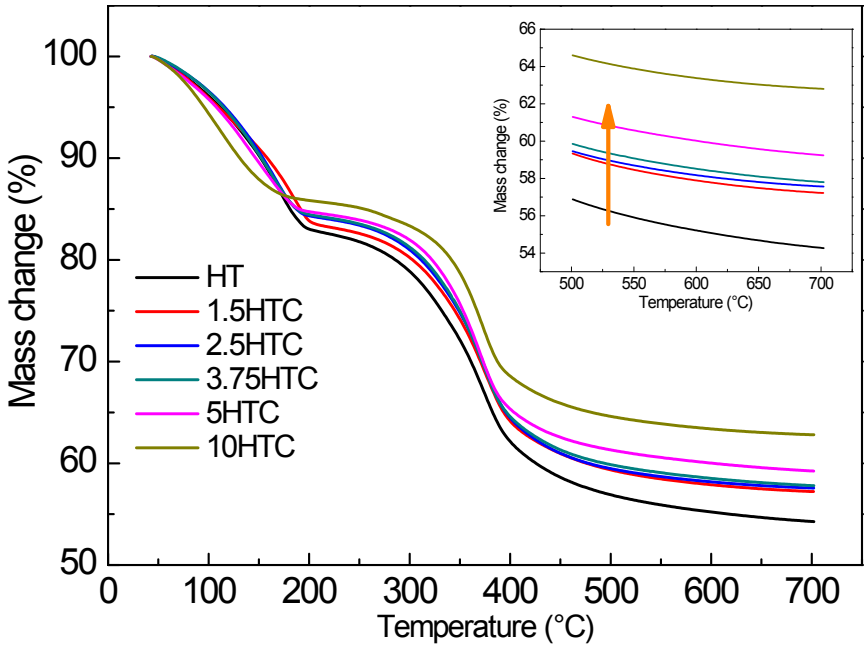

Fig.S2. TG profiles of as-prepared Ce-doped HT samples

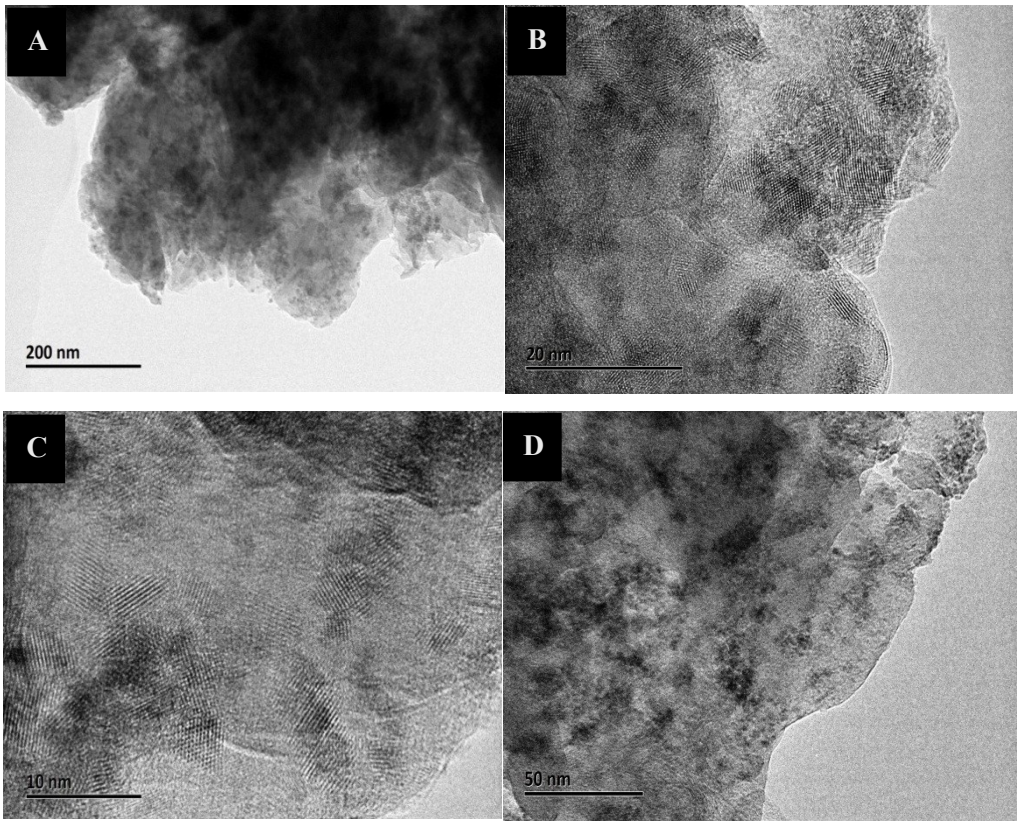

Fig.S3. TEM images of HT precursor samples: (a-c)$Mg_3Al_{0.9}Ce_{0.1}$, (d)$Mg_3Al_{0.6}Ce_{0.4}$

Table. S2

Catalyst	BE, eV							
	v	v'	v''	v'''	u	u'	u''	u'''
1.5CeLDO	882.4	885.6	888.6	898.3	900.9	904.2	907.2	916.8
2.5CeLDO	882.4	885.6	888.6	898.3	900.9	904.2	907.2	916.8
3.75CeLDO	882.3	885.3	889	898.3	900.8	903.8	907.6	916.8
5CeLDO	882.3	885.4	889	898.2	900.9	904	907.5	916.8
10CeLDO	882.3	884.7	888.8	898.2	900.8	903.2	907.4	916.8

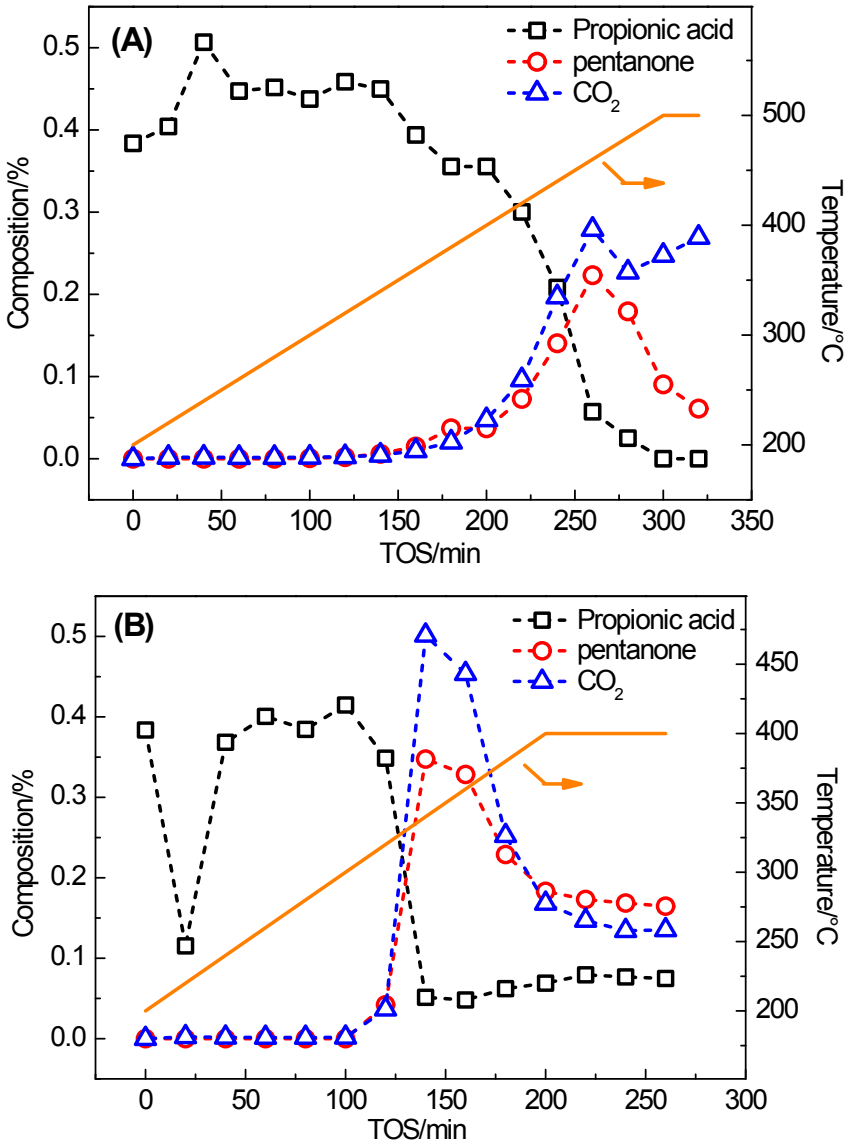

Fig.S4. Profiles of the temperature-programmed ketonization reaction of propionic over (a) Al_2O_3 and (b) MgO.