Supplementary Information

Thermoanalysis

Fig. 1 shows the corresponding DTA-TG pattern of the CP particles before calcinations. A sharp endothermic peak at 84.6℃ corresponded to a thermo weight-loss of about 8.5%. This change indicated the evaporation of deionic water. A weak endothermic peak and several broad exothermic peaks from 158.9℃ to 648.9℃ were observed, which corresponded to a rapid drop of about 55.6% in the weight loss curve. The front endothermic peak occurs at 236.7℃, which could be ascribed to the decomposition of polyelectrolytes （PDADMAC/PAA）and the organic components of YCs. The latter indicated the combustion of residual organic matrix. There was almost no change in TG curve above 650℃, which suggested the complete removal of biotemplates. Another broad peak detected between 650℃ and 800℃ without weight loss could be regarded as the range of crystalline phase change. The 64.1% weight loss starting from 31℃ to 650℃ was due to the elimination of the biotemplate and no further weight loss was observed for temperature increased above 650℃.

Information provided by DTA-TG analysis was used for the optimization of burning protocol.

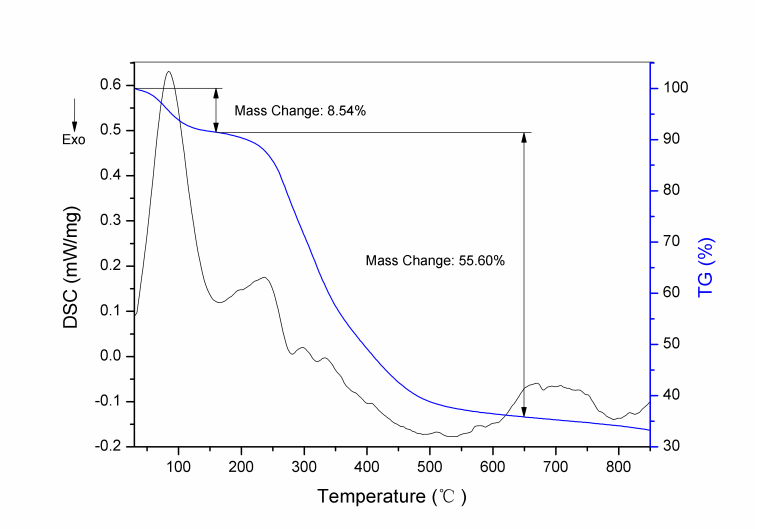

Fig. 1 The DTA-TG pattern of sample CP30.

Elemental analysis

Fig. 2 shows the EDS surface scan curves of CP from different sintering temperatures. Before sintering, the sample contained seven elements: C, O, P, Ca, N, and S (in curve A). C, N and S are derived from the biotemplate, while P and Ca belong to CP. Curve B indicates that N disappears and the peak intensity of C and S weaken, which implies the ratio of biotemplates in that sample declined after calcinations. Curve C indicates that S also disappears and the peak intensity of C weaken further, while the peak intensity of Ca, P, and O increase, which implies that the biotemplate was removed completely and the pure CP remained. The exited week peak of C could be the sign of CO_3^{2-} remaining in the CP layer.

The EDS data could further confirm the effect of sintering for the biotemplate removal and the qualitative analysis of the products.

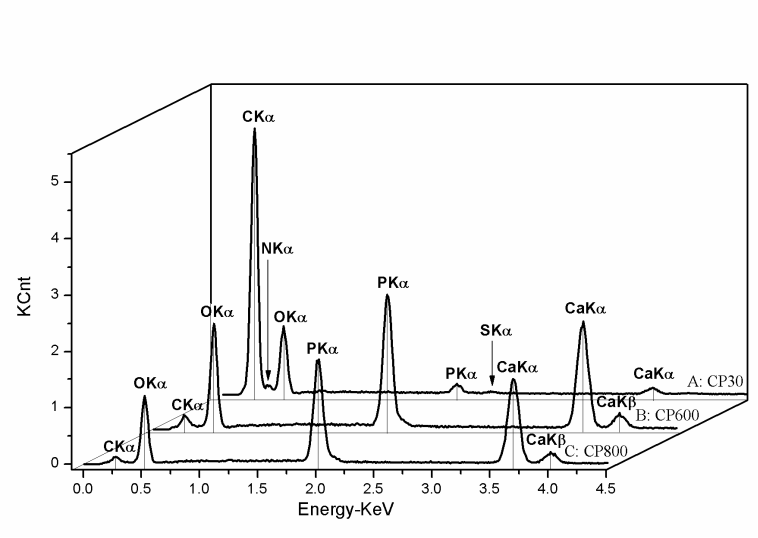

Fig. 2 Representative EDS surface scan from synthetic products.

Note

TG-DSC was carried out on a NETZSCH STA 449C thermal analyzer (heating speed 10℃ min^{-1}, nitrogen atmosphere). Energy Dispersive Spectrometer (EDS, SHIMADZU EPMA-1600, Japan) was used to make qualitative and quantitative analysis of the elements distribution of micro-areas of the products (Acc.V=15.0 kV, B.C=7.5nA).