Electronic Supplementary Material (ESI) for RSC Advances.

Electronic supplementary information (ESI) for

Zirconium, Hafnium and Their Ternary Carbide Nanoparticles by an in-situ Polymerization Route

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Characterization Techniques. *FT-IR Spectroscopy.* The fourier transform infrared (FT-IR) spectra of the samples were recorded on an Avatar 360 spectrometer (Nicolet) in the 4000–400 cm^{-1} frequency range with a resolution of 4 cm^{-1}, using KBr pellets.

^{13}C NMR Spectroscopy. Liquid-state ^{13}C nuclear magnetic resonance (^{13}C-NMR) data was collected with a Bruker Avance-400MHz spectrometer. Solid-state ^{13}C NMR spectra were recorded on a Bruker Avance Ⅲ 400 NMR spectrometer operating at 100.6 MHz using a cross-polarization magic angle spinning (CP-MAS) technique.

Thermal Analysis. Thermal behavior of the metal carbide precursor was studied by differential scanning calorimetry and thermal gravimetric analysis (DSC-TG; Netzsch STA 449F3).

X–ray Diffraction. Powder X–ray diffraction patterns were performed on a D8 Diffractometer from Bruker instruments (Cu Kα radiation, λ=0.154 nm) equipped with a scintillation counter.

Microstructural Characterization: Morphology of the powder samples was observed by a scanning electron microscope (SEM; HITACHI S-4800).

Particle size distribution. Particle size distribution was performed on LS900 (Zhuhai OMEC Instrument Co., Ltd., China) laser particle size analyzer.

Specific Surface Area. Specific surface area of solids prepared was determined by nitrogen sorption experiments with a Quantachrome Autosorb-1 at liquid nitrogen temperature, and data analysis was performed by

Quantachrome software.

Transmission Electron Microscopy. TEM and HRTEM images were taken on a Tecnai F20 microscope operating at 200 kV.

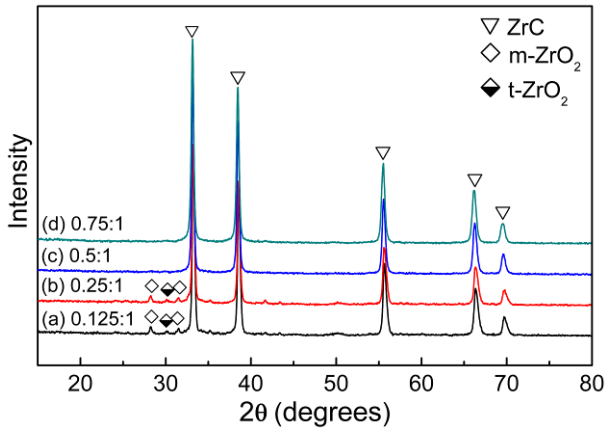

Figure S1. XRD patterns of ZrC precursor (EG/metal molar ratio was set to 1) with CA/metal molar ratios of (a) 0.125:1, (b) 0.25:1, (c) 0.5:1 and (d) 0.75:1 pyrolysed at 1400 °C.

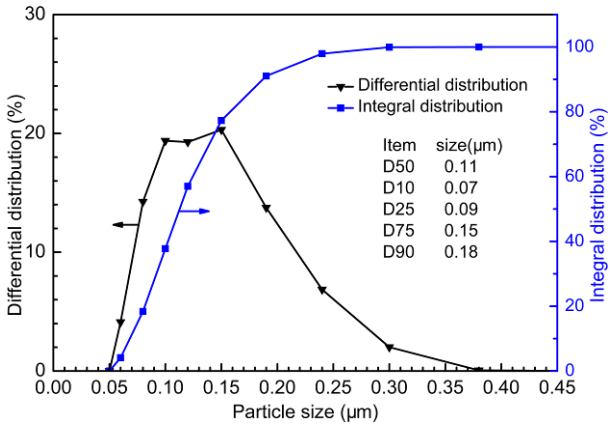

Figure S2. Particle size distributions for ZrC particles obtained at 1300 °C.