Controlled Synthesis of Double-Shelled CeO$_2$ Hollow Spheres and Enzyme-free Electrochemical Bio-Sensing Properties for Uric Acid

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Supporting Information

1. Fig. S1 TG curve of as-obtained double-shelled CeO$_2$ HSs.

Fig. S1 TG curve of as-obtained double-shelled CeO$_2$ HSs
XRD analysis was performed to check the composition of these products at different solvothermal stages and the results were shown in Fig. S2. All the products were mainly composed of cubic phase CeO$_2$. Some trace amount of Ce(CO$_3$)OH can be found in the samples when reaction time was prolonged to more than 3h. During the solvothermal process, trace CO$_2$ was formed by oxidation of PEG after prolonged reaction time. Due to the appearance of H$_2$O in the reaction, trace Ce$^{3+}$ existed in the form of [Ce(H$_2$O)$_n$]$^{3+}$, and then changed into [Ce(OH)(H$_2$O)$_{n-1}$]$^{2+}$, which reacted with CO$_3^{2-}$ in the solution to form Ce(CO$_3$)OH, finally. Since the oxidation of PEG to form CO$_2$ is a relative slow process, the formation of ceria hydroxy carbonate phase can only be observed at prolonged reaction time. It should be noted that all these trace impurities can be entirely removed by following heat treatment and the final product is a pure CeO$_2$ phase.