Supplementary Information

Polydopamine-coated cerium oxide core-shell nanoparticles for efficient and non-damaging chemical-mechanical polishing

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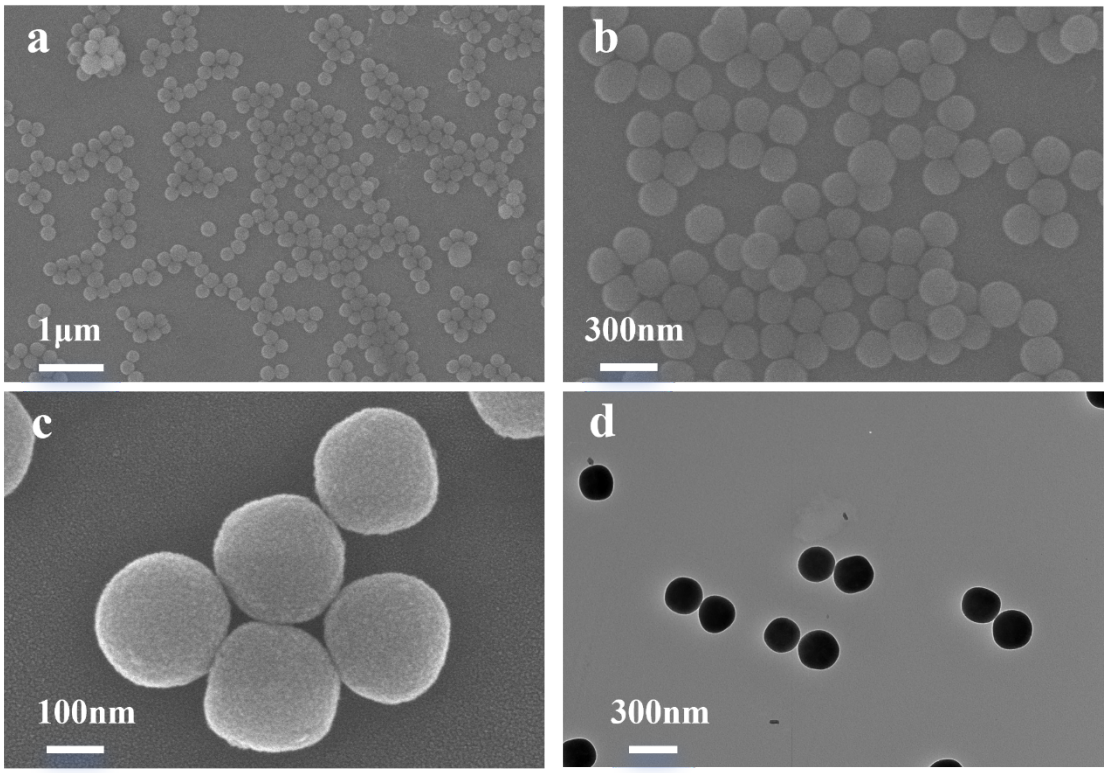

Figure S1. SEM and TEM images of the SiO_2 nanospheres prepared by the *Stöber* method. The SEM and TEM images reveal that the SiO_2 nanospheres (ca. 240 nm in diameter) exhibit a uniform and relatively smooth spherical morphology over a wide scope.

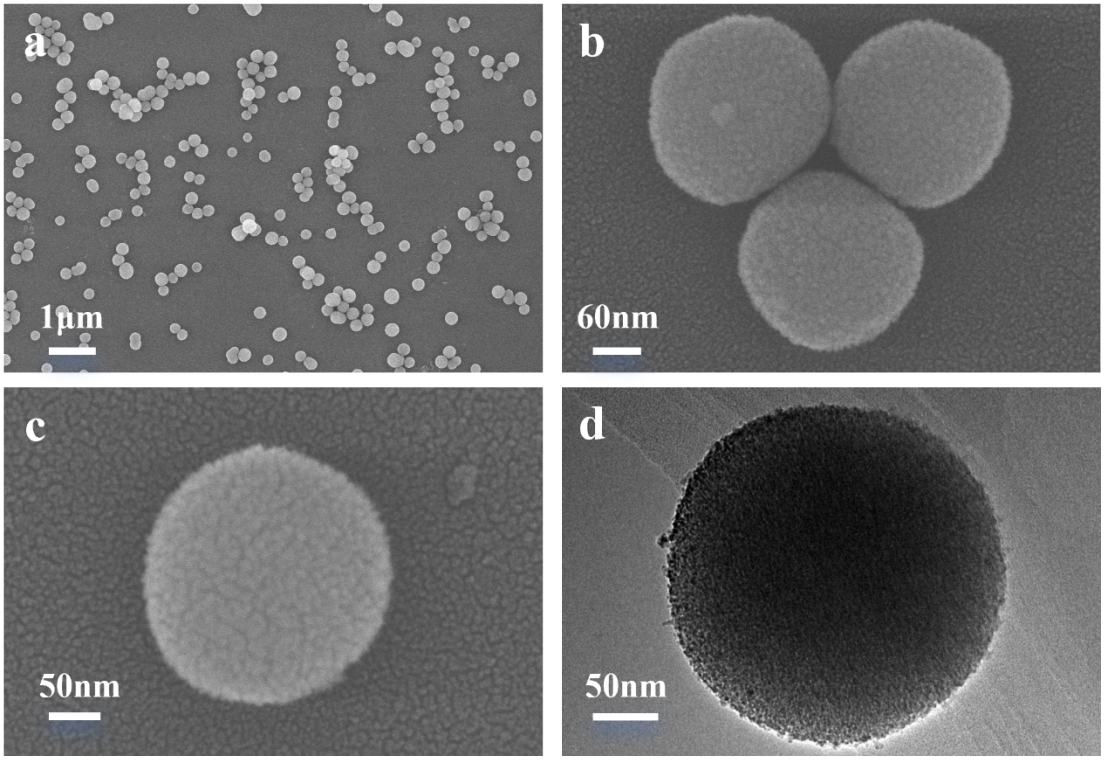

Figure S2. SEM and TEM images of the SiO_2@CeO_2 composite abrasives.

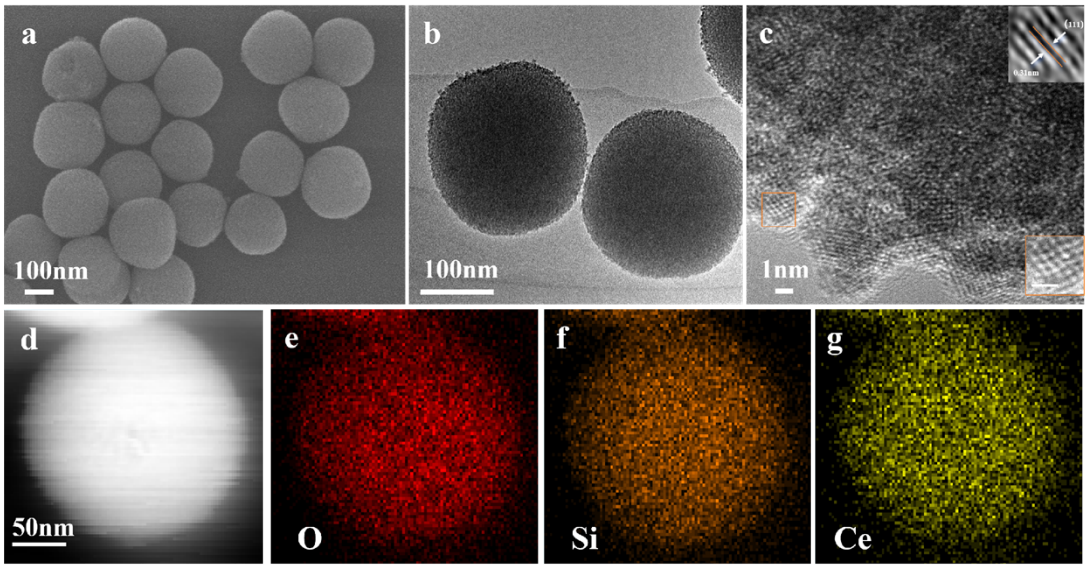

Figure S3. SEM (a), low- and high-resolution TEM (b, c) images of the SiO_2@CeO_2 composite abrasives, which show the anisotropic growth of the lattice orientation along the (111) crystal plane in different regions. High-angle annular darkfield scanning TEM (HAADF.STEM) image (d) and energy dispersive X-ray spectroscopy (EDS) elemental mapping images of O (e), Si (f), Ce (g) of SiO_2@CeO_2 composite abrasives.

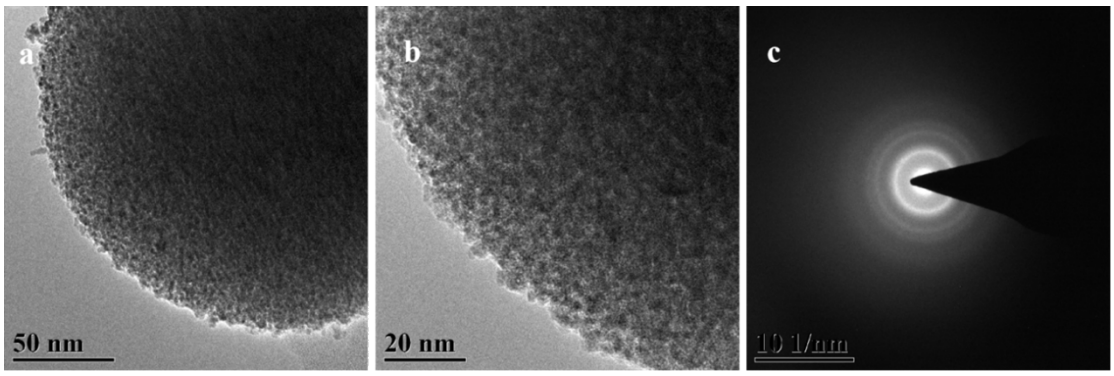

Figure S4. (a, b) HR-TEM images of the SiO_2@CeO_2 composite abrasives at different magnifications. (c) Lattice and selected electron diffraction patterns of the SiO_2@CeO_2 composite abrasives. No well-resolved diffraction rings can be observed in the high-resolution transmission electron microscopy (HRTEM) image and SAED pattern indicating the amorphous characteristics of such monodisperse SiO_2@CeO_2 composite abrasives.

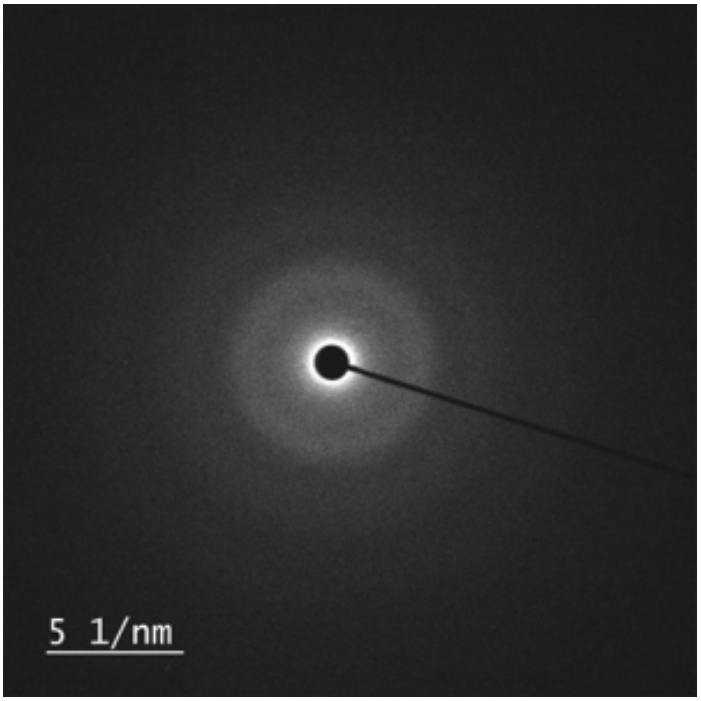

Figure S5. Selected area electronic diffraction (SAED) pattern, indicating the amorphous characteristics of such monodisperse SiO_2@CeO_2@PDA composite abrasives.

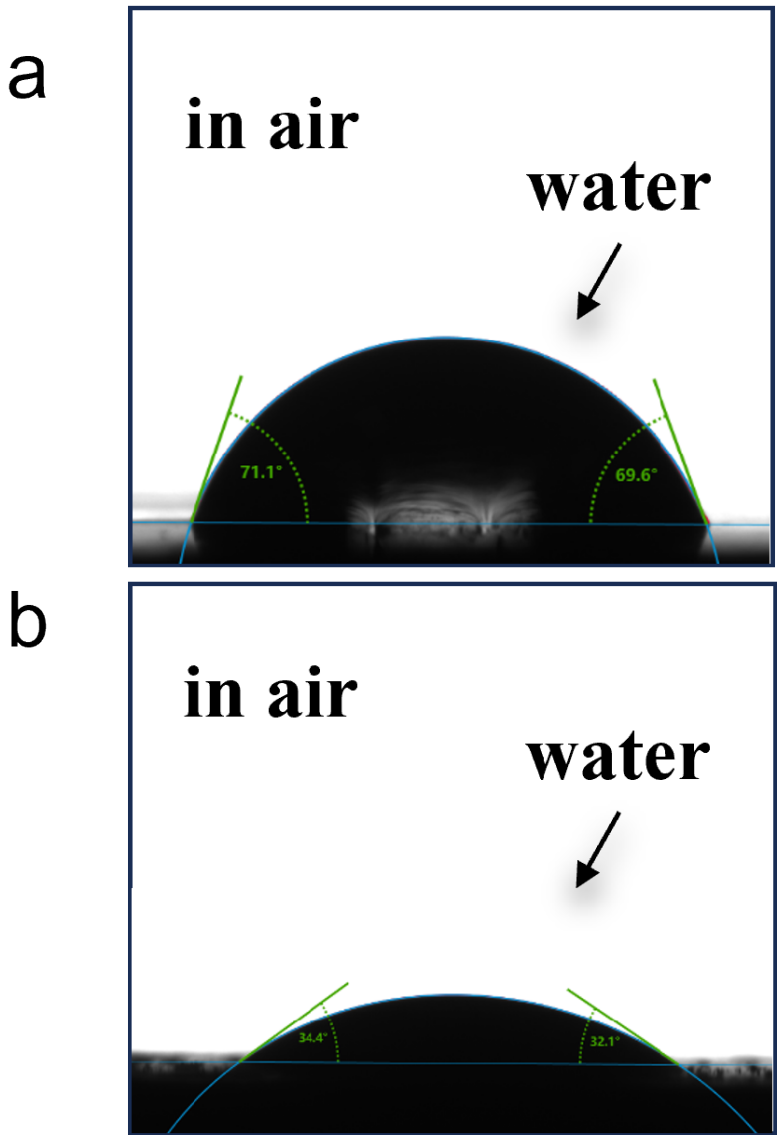

Figure S6. The contact angle (CA) of SiO_2@CeO_2 (a) and SiO_2@CeO_2@PDA (b) composite abrasives on the SiO_2 wafer. The results showed that the hydrophilicity of the dopamine-modified abrasives was significantly enhanced.

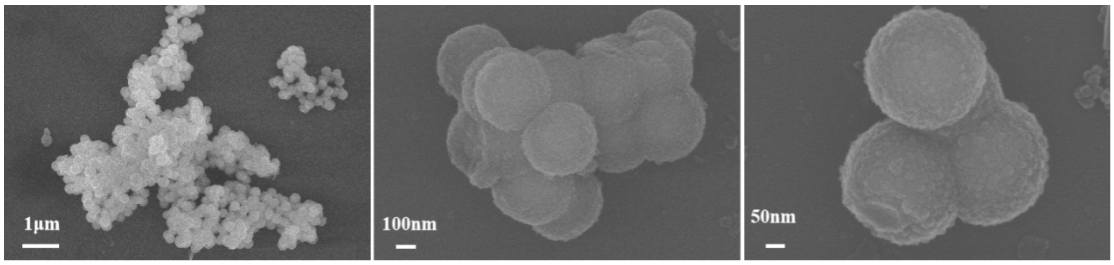

Figure S7. SEM(a), (b), (c) images of the SiO_2@CeO_2@PDA (16h) composite abrasives at different magnifications. While the reaction time was increased to 16 h, the further disordered growth of PDA resulted in serious abrasive agglomeration.