Confining the polymerization of aniline to generate yolk-shell polyaniline@SiO$_2$ nanostructure

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**Figure S1.** HRTEM images of CeO$_2$ (A, B), CeO$_2$@SiO$_2$ (B, C) and PANI@SiO$_2$ (E)
Figure S2. EDS analysis of CeO$_2$ (A) and CeO$_2$@SiO$_2$ NPs (B)
Figure S3. UV–vis spectra of CeO$_2$@SiO$_2$ NPs at different reaction time in acidic solution without aniline.

Figure S4. UV–vis spectra of CeO$_2$@SiO$_2$ NPs at different reaction time in acidic solution with aniline.
**Figure S5.** TEM image of PPy@SiO$_2$ obtained at room temperature.

**Figure S6.** TEM image of PPy@SiO$_2$ obtained at 323K.