Supplementary information

Probing the impact of material properties of core-shell SiO$_2$@TiO$_2$ spheres on the plasma catalytic CO$_2$ dissociation using packed bed DBD plasma reactor

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Raman spectroscopy:

Figure S1. Comparison of SiO₂ Raman modes in as-prepared core-shell spherical particles and bare SiO₂ spherical particles.

Figure S2. Raman spectroscopy of fresh and spent SiO₂@TiO₂ – 0.10M+LUDOX and SiO₂@TiO₂-0.25M+LUDOX materials (AP = After Plasma catalysis).
Scanning electron microscopy:

Figure S3: Scanning electron microscopy of uncalcined SiO$_2$@TiO$_2$ – 0.25M packing material with and without LUDOX
**Figure S4:** Scanning electron microscopy of SiO$_2$@TiO$_2$ – 0.10M+LUDOX and 0.25M+LUDOX packing materials after multi-point space time measurement.
Gas Hourly Space Velocity ($h^{-1}$):

$$\text{Gas Hourly Space Velocity} \ (h^{-1}) = \frac{\text{Volume of feed flow gas (ml/h)}}{\text{Volume of catalyst (ml)}}$$

**Figure S5.** Plasma catalytic CO$_2$ conversion as a function of Gas Hourly Space Velocity (GHSV, $h^{-1}$) for unpacked and packed reactors
Multi-point space time measurements:

**Figure S6.** Energy efficiency of plasma catalytic CO$_2$ dissociation as a function of space time. The vertical dashed line corresponds to the single point residence time (14.07 s)