Supporting Information

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Anisotropic Janus Catalysts for Spatially Controlled Chemical Reactions

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1. Characterization

Confocal laser scanning microscopy (CLSM; Olympus FluoView 500) is used to examine the compartmentalized fluorescence distributions in the bicompartmetal PLGA/TTBO particles. A 405 nm UV laser and 488 nm Argon laser are used to excite MEHPV and PTDPV respectively. The barrier filter for detection range is confined to 430-460 nm for MEHPV and 505-525 nm for PTDPV. The particles for CLSM imaging are collected on glass coverslips which are placed on top of the Al substrate during EHD co-jetting. Scanning electron microscopy (SEM; FEI Nova Nanolabs) is used to characterize surface morphology of bicompartamental particles, and CNTs grown on the TiO$_2$ particles. An energy dispersive spectrometer (EDX) is used to observe the elemental distribution of the particles. All samples are sputtered with gold before SEM and EDS imaging. The PLGA/TTBO particles and TiO$_2$ particles with CNTs are directly observed under SEM on the Al or quartz substrate. For TiO$_2$ particle imaging, about 10 µl of a TiO$_2$ particle water suspension is cast on a small piece of Al or glass substrate, and water is allowed to evaporate at room temperature. Dynamic light scattering (DLS; ZEN 3600, Malvern) is used for the measurements of hydrodynamic diameters of the particles. Transmission electron microscopy (TEM; JEOL 3011) is employed to observe the internal structure of TiO$_2$ particles. Resonance Raman spectra of the CNT were taken with a Dimension-P1 Raman system (Lambda Solutions, Inc.) with 532 nm excitation. The laser power is 20 mW and the spot size is ~ 25 µm at 50× magnification.
2. EDX spectrum

**Figure S1.** EDX spectrum of Janus particles A) before calcination (Figure 1E) and B) after calcination (Figure 4): Al and Au came from substrate and sputtering procedure, respectively.
3. TGA profile of PLGA-TTBO nanoparticles

Figure S2. TGA thermogram of PLGA-TTBO composite particles (under air atmosphere, ramp 10 °C/min)
4. Different porosity of nanoparticles after calcination

**Figure S3.** SEM image of calcinated nanoparticles originated from different titania precursor A) TTIP (titanium(IV) isopropoxide), and B) TTBO (same with Figure 3).
5. Raman spectrum of CNT

![Raman spectrum of CNT grown from Janus catalysts](image)

**Figure S4.** Raman spectrum of CNT grown from Janus catalysts.