Supporting Information

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H₂O₂ Generation by Decamethylferrocene at Liquid Interfaces

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1. Mass spectrometric (MS) measurements:

Mass spectrometric measurements were carried out for the 1,2-dichloroethane (DCE) phase containing 5 mM decamethylferrocene (DMFc) and 5 mM bis(triphenylphosphoranylidene)-ammonium tetrakis(pentafluorophenyl)borate (BTTPPA) on an LCT time of flight mass spectrometer combining with an electrospray ionization source (Micromass, Manchester, UK) before and after running 2 hours of two-phase reaction with an aqueous phase containing 5 mM sulfuric acid (H_2SO_4) and 5 mM lithium tetrakis(pentafluorophenyl)borate diethyl etherate (LiTPFB). The DCE solutions were diluted by acetonitrile (CH_3CN) by 1000 times prior to MS measurements.

Figure S1.1. Full range mass spectra obtained in a positive ionization mode.

Figure S1.2. Magnified mass spectra of DMFc shown in Figure S1.1.

Figure S1.3. Magnified mass spectra of bis(triphenylphosphoranylidene)-ammonium cation (BTPPA⁺) shown in Figure S1.1.

Figure S1.4. Full range mass spectra obtained in a negative ionization mode.

Figure S1.5. Magnified mass spectra of tetrakis(pentafluorophenyl)borate anion (TPFB⁻) shown in Figure S1.4.

2. UV-visible spectroscopic measurements of two phase reaction controlled by various common ions

Figure S2.1. UV-visible absorption spectra of the DCE phase in the course of two-phase reaction controlled by various common ions: TPFB[□] (a), tetramethylammonium (b), tetraethylammonium (c), tetrabutylammonium (d), and BTPPA⁺ (e). (f) The UV-visible absorption spectra of the aqueous phase before and after 72 hours of two-phase reaction using BTPPA⁺ as the common ion. The spectra (a)-(e) were recorded in a quartz cuvette filling with 0.7 mL DCE solution on the bottom and 0.7 mL aqueous solution on the top. The cuvette was covered by a Teflon cap and further sealed by Teflon tape in the course of measurement.

3. H₂O₂ partition between water and DCE

Solution 1: Freshly prepared aqueous solution containing 0.1 mM H₂O₂ and 5 mM H₂SO₄.

Solution 2: 0.1 mM H₂O₂ in an aqueous solution containing 5 mM H₂SO₄ was stirred with equal volume of DCE solvent for 10 minutes, followed by waiting 30 minutes more for separation of the two phases. The aqueous phase was then separated.

To Solutions 1 and 2, excess amount sodium iodide (NaI) was added. After waiting 60 minutes, the UV-visible spectra of these two solutions were measured.

Figure S3.1 UV-visible measurement on the partition of H₂O₂ between water and DCE.