

## Supplementary Information

### **Preparation of Inorganic-organic Hybrid Mesoporous Material Incorporating Organoruthenium Complexes ( $-\text{[C}_6\text{H}_4\text{RuCp]PF}_6^-$ ) and Its Application for Heterogeneous Catalyst**

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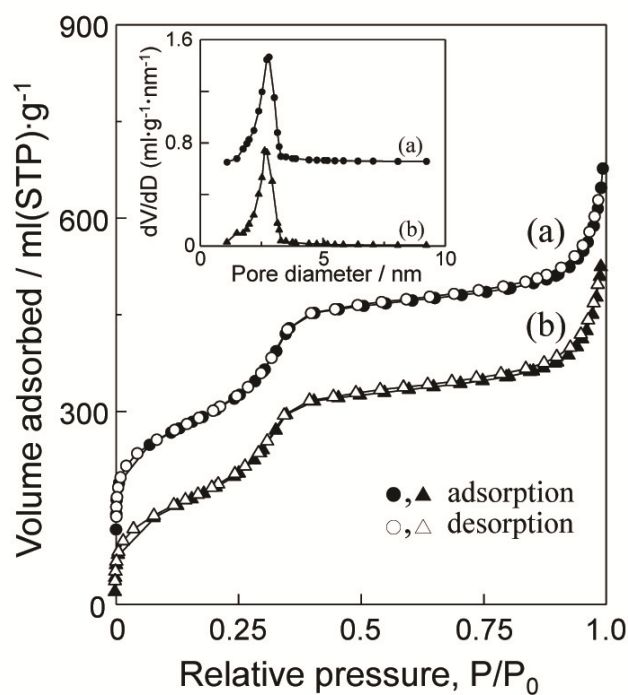
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**Materials.** Octadecyltrimethylammonium chloride, 1-hexyne, and triethylsilane were purchased from Tokyo Kasei Kogyo Co., Ltd. 1,4-bis(triethoxysilyl) benzene was obtained from Aldrich. Thallium cyclopentadienide, bis-benzeneruthenium(II) chloride, and ammonium hexafluorophosphate were obtained from Wako Pure Chemical Ind., Ltd. Dry acetonitrile, dry chloroform, and HCl (37%) were also obtained from Nacalai Tesque Inc. All chemicals were used without further purification.

**Characterization methods.** Powder X-ray diffraction (XRD) patterns were recorded using Cu K $\alpha$  radiation ( $\lambda=1.5406 \text{ \AA}$ ) on a Shimadzu XRD-6100 diffractometer operating at 40 kV and 30 mA. Diffuse reflectance UV-vis spectra were measured at 298 K with a Shimadzu UV-2200A double-beam digital spectrophotometer. XAFS (XANES and EXAFS) spectra were obtained at the BL-01B1 facility of SPring-8 at the Japan Synchrotron Radiation Research Institute (JASRI). The Ru K-edge X-ray absorption spectra were recorded in fluorescence mode with a Si(111) two-crystal monochromator at room temperature. The extended X-ray absorption fine structure (EXAFS) data were examined using the analysis program (Rigaku REX2000). The pre-edge peaks in the X-ray absorption near-edge structure (XANES) regions were normalized for atomic absorption, based on the average absorption coefficient of the spectral region. Fourier transformations were performed on  $k^3$ -weighted EXAFS oscillations in the range 3–16  $\text{\AA}^{-1}$  to obtain the radial structure function. Nitrogen adsorption-desorption isotherms were recorded by using a BEL-SORP max (BEL Japan, Inc.) at 77 K after degassing of samples under vacuum at 473 K for 2 h.

**Hydrosilylation of 1-hexyne.** The hydrosilylation of 1-hexyne with triethylsilane was performed by using specially manufactured vacuum line system equipped with 1-hexyne and triethylsilane reservoir. The fixed amount of catalyst (30 mg) was charged into the reaction vessel (volume: 80 ml) and pre-evacuated at 473 K for 1 h. The hydrosilylation of 1-hexyne (540  $\mu\text{mol}$ ) with triethylsilane (540  $\mu\text{mol}$ ) was carried out at each temperature (298, 473, 523, 573, and 623 K) for 15 h. The analysis of the products was performed on a gas chromatograph (Shimadzu GC-14B with a flame ionization detector) equipped InertCap<sup>®</sup>1 capillary column. The turnover number (TON) was determined as the total amounts (in mol) of products ( $\alpha$ -vinylsilane and  $\beta$ -vinylsilanes) divided by the amount (in mol) of  $-\text{[C}_6\text{H}_4\text{RuCp]PF}_6-$  moieties within HMM-phRuCpPF<sub>6</sub> used for the reaction (30 mg).



**Figure S1.** Nitrogen adsorption/desorption isotherms and (inset) pore size distribution curve of (a) HMM-ph and (b) HMM-phRuCpPF<sub>6</sub>.

**Table S1.** Textual properties of HMM-ph and HMM-phRuCpPF<sub>6</sub>.

Samples	Surface area / m <sup>2</sup> g <sup>-1</sup>	Pore volume <sup>a</sup> / cm <sup>3</sup> g <sup>-1</sup>
HMM-ph	809	0.78
HMM-phRuCpPF <sub>6</sub>	789	0.72

<sup>a</sup> Determined from the Barret-Joyner-Halenda (BJH) method.