Electronic Supplementary Information for

Activity of Polyoxometalate Toward Model Cell Membranes

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1. Experimental details

1.1 Chemicals. Egg-PC (Avanti polar lipid), Keggin-type POMs ($SiW_{12}O_{40}^{4-}$ and $PW_{12}O_{40}^{3-}$) (Wako Pure Chemical Industries, Ltd.,Osaka, Japan) were used without further purification. $P_2W_{18}O_{62}^{6-}$ was synthesized according to ref S1. The buffer solution used in all experiments was Tris/HCl (pH 8.5).

1.2 Vesicle preparation. 150 μl of egg-PC chloroform solution (10 mg/ml) was dried under a nitrogen stream for several minutes, and then under vacuum overnight. The dried lipid films were hydrated with 100 μl of 5-carboxyfluorescein buffer solution. The solution was bath-sonicated for 10 min to clarify it. The obtained solution was filtered over Sephadex G-25.

1.3 Leakage experiments. The lipid vesicle solution was diluted to the desired concentration with buffer solution. 100 μl of a POM buffer solution was added to 3 ml of the diluted vesicle solution. Fluorescence spectra were acquired using an FP-6300 instrument (JASCO), measuring every 1 min after the addition of POM. After the fluorescence intensity became almost saturated, 100 μl of sodium dodecyl sulfate (SDS) buffer solution (0.2 g/ml) was added to complete the vesicle destruction. The fluorescence intensities before the addition of POM and after the addition of SDS are defined here as I_0 and I_{max}. The leakage fraction was then

estimated using

$$Leakage = \frac{I(t) - I_0}{I_{max} - I_0} \times 100$$

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1.4 Other measurements. π-A isotherm measurements were performed using a KSV minitrough at a constant speed of 10 mm/min. DLS measurements were carried out using an ELS-Z2M instrument (Otsuka Electronics).

1.5 π-A isotherms for other POMs

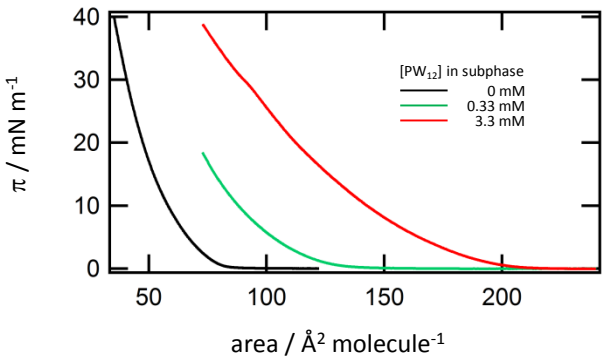

Figure S1. π-A isotherms for egg-PC monolayer at 22°C on Tris/HCl subphase containing different concentrations of PW_{12}.

We have done π-A isotherm measurements for PW_{12}, whose results were almost the same with those for SiW_{12} shown in Figure 2. The addition of PW_{12} in the subphase shifted the π-A curve to give a larger area. These results support our discussion in the main text that POMs interacted electrostatically with the egg-PC membrane surface, and formed conjugates with an expanded structure.

References:

S1. R. G. Finke, M. W. Droege, P. J. Domaille, *Inorg. Chem.*, 26, 3886 (1987).