Supplementary Material (ESI) for Soft Matter

Supporting Information

A block-copolymer hydrogel encapsulates bacteriorhodopsin and produces the longest photochromic response of the membrane protein under high water content

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As preparation of mixture of PM and macromonomer solution is concerned, bulk suspension of PM with a concentration of 20 mg mL^{-1} was sonicated carefully to get a smaller size of PM patches (< 500 μm); then, a 75 μL aliquot of bulk PM suspension was mixed with a 15 wt % F127-DA solution to reach a suitable concentration as needed. The mixture was stirred for 4 days at room temperature (about 25 °C).

As the measurements about Figures 1 and 3 are concerned, flash-induced kinetics

of M_{412} was recorded in our home-made kinetic spectrophotometer at 25 °C. Samples were first excited by a camera flash (YINYAN BY-26AZ) equipped with a glass filter, which provided green light around 570 nm near the absorption peak of the background state of BR, then changes of optical density (OD) at 412 nm corresponding to the absorption peak of the M intermediate were recorded by a measuring beam perpendicular to the excitation light.

The resulting time constants ($\tau_{1/e}$) in Figure 1 and Figure 3 are fitted by a single exponential decay, and the results are given in Table S1 and S2.

Table S1. Fitted time constants of M of BR-WT and BR-D96N in different solutions in Figure1

	BR-WT	BR-D96N	BR-WT/F127-DA	BR-D96N/F127-DA
pH 7.0	0.004 s	1.1 s	2.0 s	14.4 s
pH (~10)	0.12 s	72 s	6.3 s	98 s

Concentration of BR-WT or BR-D96N was 0.75 mg mL^{-1} and concentration of F127-DA, 10 wt %. The molecular ratio of F127-DA: BR-WT or BR-D96N was 375. Samples that were at pH 7.0 were in 10 mM NaCl and 10 mM PBS, while that of pH ~10.0 were in 10 mM NaCl and 10 mM PBS and adjusted by 1 M NaOH solution.

Table S2. Fitted time constants of M of BR-D96N in different solutions in Figure 3

	BR-D96N	BR-D96N in PEO8K-DA	BR-D96N in Triton X-100	BR-D96N in F127	BR-D96N in F127-DA
$\tau_{1/e}$	1.1 s	1.5 s	7.3 s	13.4 s	14.7 s

In all samples concentration of BR-D96N was 0.75 mg mL^{-1}, and PEO8K-DA, 10 wt % (1.23×10^{-5} mol mL^{-1}); Triton X-100, 0.5 wt % (0.77×10^{-5} mol mL^{-1}); F127, 10 wt % (0.79×10^{-5} mol mL^{-1}); F127-DA, 10 wt % (0.78×10^{-5} mol mL^{-1}). All samples were in 10 mM NaCl and 10 mM PBS at pH 7.0.

As the measurements about Figure 2 are concerned, spectra measurements were carried out on a SHIMADZU UV-3150 spectrophotometer at 25 °C. A 9 mW cm^{-2} light source from tungsten-halogen lamp equipped with the same glass filter as noted

in flash-induced kinetics determination was used as the excitation light.

M decay of BR-D96N incubated in F127-DA aqueous solution after polymerization is shown in Figure S1.

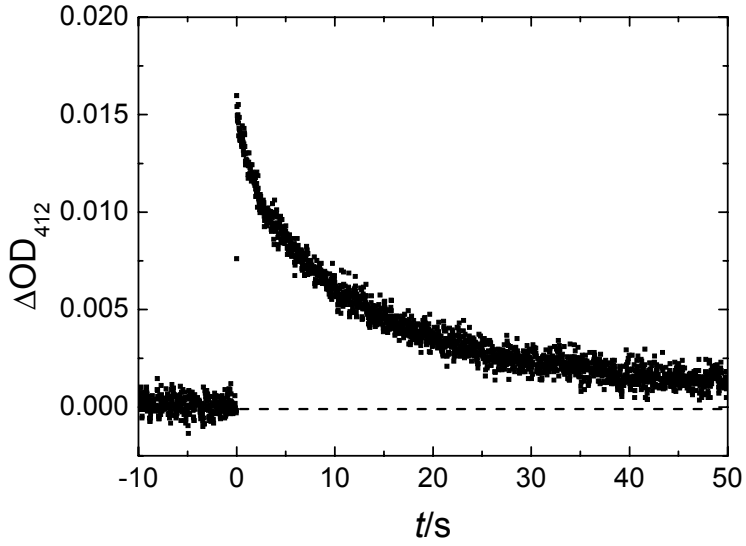

Figure S1. Flash-induced M intermediate of BR-D96N/F127-DA after photopolymerization. The fitted time constant by a single exponential decay was 11.4 s. Concentration of BR-D96N was 0.75 mg mL^{-1} and F127-DA, 10 wt %. The sample was in 10 mM NaCl and 10 mM PBS at pH 7.0.