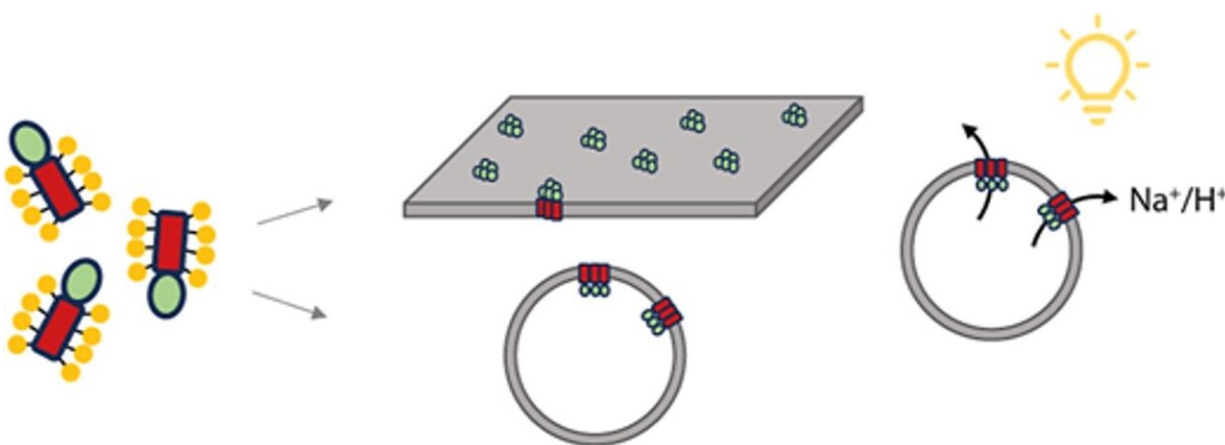


Light-driven proteins in artificial membranes—a new method for biohybrid systems

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Researchers have developed an innovative method of incorporating light-controlled membrane proteins into flat and spherical artificial polymer membranes. Credit: University of Basel, Creative Commons CC BY 4.0

Light-driven membrane proteins are key components in biohybrid systems because they can convert light energy into ion gradients, enabling energy conversion or sensory applications. While their integration into natural lipid membranes is well studied, embedding them in artificial polymer membranes has proven challenging.

Although polymer membranes are mechanically more stable and durable

than lipid membranes, their physicochemical properties (for example, thickness and flexibility) make protein incorporation difficult.

In a study appearing in *Biomacromolecules*, researchers led by Professor Cornelia Palivan (Department of Chemistry, University of Basel) and Dr. Richard Kammerer (Paul Scherrer Institute PSI) [successfully integrated the light-driven sodium-proton pump protein KR2](#) from the bacterium *Krokinobacter eikastus* into flat and spherical polymer membranes made of PMOXA-b-PDMS.

"We used a mild detergent (DDM) that locally softens the polymer membrane without destroying its structure. This allowed us to successfully incorporate KR2 without compromising its functionality," explains Dr. Piotr Jasko, first author of the study and former doctoral student at the SNI Ph.D. School.

Using surface-sensitive measurement techniques and fluorescence methods, the researchers confirmed that KR2 continued to transport ions when exposed to light. A fluorescent marker also enabled quantitative determination of protein incorporation.

"Our method works for both flat (2D) and spherical (3D) polymer membranes and could also be applied to other membrane proteins and polymer membranes," Palivan summarizes. "This paves the way for the development of biohybrid membranes that can use light energy for ion transport, sensing or energy conversion."

More information: Piotr Jasko et al, Functional Insertion of the Light-Induced Ion Pump KR2 into Block Copolymer Membranes, *Biomacromolecules* (2026). [DOI: 10.1021/acs.biomac.6c00738](https://doi.org/10.1021/acs.biomac.6c00738)

Provided by University of Basel

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