SOLAR POWER

Solar-powered smart sunglasses

Organic solar cells' low weight, mechanical flexibility, arbitrary coloring, and other attributes provide engineers with exceptional freedom when it comes to designing applications. Researchers in Germany have capitalized on that combination of properties to conduct a case study on the fabrication, optimization, and performance of a self-powered, wearable smart device: electronic sunglasses with integrated solar cells (*Energy Technol.* 2017, DOI: 10.1002/ente.201700226). The sunglasses, which were designed by Dominik Landerer, Alexander Colsmann, and coworkers at Karlsruhe Institute of Technology, feature organic solar cells embedded in the lenses. For device evaluation purposes, the team designed the glasses such that the semitransparent cells supply power to sensors that monitor illumination intensity and

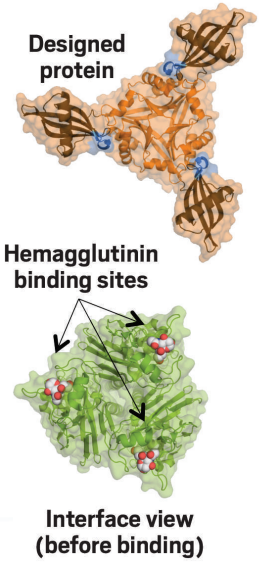
The lenses of these sunglasses feature organic solar cells that power sensor and display circuitry housed in the frames.

ambient temperature. The temples of the glasses' frame house the sensors, microprocessor, and liquid-crystal display circuitry. The team used solution-phase processing methods and commercially available organic polymers and fullerenes to assemble the light-absorbing photovoltaic layer. The researchers note that the sunglasses, which resemble commercial ones in appearance, weight, and eye protection against UV radiation, function reliably in intense outdoor light and typical indoor lighting.—MITCH JACOBY

INFECTIOUS DISEASE

Custom peptide neutralizes influenza

If you want to thwart infection by influenza viruses, a good bet is to block the pathogen's exterior hemagglutinin proteins from binding with a host cell's sialic acid-containing sugars. Nature already uses this interference strategy: Antibodies bind influenza hemagglutinin, preventing infection by obstructing the host-pathogen interaction in a variety of ways, sometimes at the sialic acid binding site and other times with just the antibody's sheer physical bulk. This bulk has its downside, though: Only one antibody can bind a hemagglutinin site at a time. David Baker and Eva-Maria Strauch of the University of Washington and colleagues wondered if they could design a protein that bound hemagglutinin in three places simultaneously instead of just one, to improve on nature's avidity—the overall strength of binding. They theorized this would be possible because hemagglutinin forms regular trimers on the surface of the virus. First, the team used a computational strategy to design a protein that could bind one of hemagglutinin's sialic acid receptor sites (*Nat. Biotechnol.* 2017, DOI: 10.1038/nbt.3907). Then they built a scaffold that could orient three of these hemagglutinin-binding proteins simultaneously on the surface of the virus. When they tested their design, the three-pronged weapon neutralized influenza in cell culture and protected mice from infection by the pathogen.—SARAH EVERTS



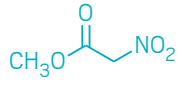
A designed protein (brown and orange) binds the influenza hemagglutinin protein (green) at three locations simultaneously to block infection.

CREDIT: *ENERGY TECHNOL.* (GLASSES); DAVID BAKER/U WASHINGTON (INFLUENZA PROTEIN)

PROCESS CHEMISTRY

Safer, greener route to methyl nitroacetate

Methyl nitroacetate is a handy chemical building block. It can be used to produce α-amino acids, isoxazoles, and α,β-unsaturated compounds. It's also a useful reactant in Michael additions, Mannich reactions, and cyclopropanations. But it's expensive. One gram costs anywhere from $22 to $115, depending on the vendor. That's probably because the process that has been used to make methyl nitroacetate for more than 40 years is dangerous. The 1976 procedure published in *Organic Syntheses* (DOI: 10.15227/orgsyn.055.0077) requires one to dry the highly explosive intermediate dipotassium salt of nitroacetic acid in a vacuum desiccator and then grind it with a mortar and pestle. The protocol also uses carcinogenic benzene as an extraction solvent and requires two distillations. Now, Pablo E. Guzmán, Jesse J. Sabatini, and coworkers at the U.S. Army Research Laboratory have developed a safer, more environmentally friendly way to make this ester (*Org. Process Res. Dev.* 2017, DOI: 10.1021/acs.oprd.7b00093). The new procedure eliminates the drying and grinding steps and uses either ethyl acetate or dichloromethane as the extraction solvent. It also requires a single distillation rather than two. "While our yield is slightly lower than the original procedure, we feel it's quite acceptable in exchange for minimizing both the safety and environmental hazards," Sabatini tells C&EN.—BETHANY HALFORD



Methyl nitroacetate