



Artificial photosynthesis offers a potential route to the green pastures of affordable energy in a sustainable, environmentally friendly manner. Standing between those verdant fields and us are several new and undiscovered materials that are needed to drive the efficient and cost-effective splitting of water by a solar-fuels device.

Inside the renovated Jorgensen Laboratory, researchers from the Joint Center for Artificial Photosynthesis (JCAP) Energy Innovation Hub are using a high-throughput discovery process to expedite their search for new semiconductors that can function as light absorbers and new catalysts that are up

Fast-tracking Discoveries

to the task of efficiently evolving oxygen and chemical fuels such as hydrogen.

These scientists have replaced the inks in an ink-jet printer with salt solutions of Earth-abundant materials such as iron, cobalt, and nickel, to print out alloys made of varying concentrations of those materials on glass plates. Their selections are based on their knowledge of which mixtures work naturally, which have been tried previously, and which ones theoreticians would put their money on to succeed. Then, using custom-designed instruments, the JCAP teams screen thousands of compounds to see how well they perform as the catalysts and semiconductors that would form key pieces of a solar-fuel generation device.

Thanks to this fast-tracking process,

the researchers have already discovered a critical component for artificial photosynthesis, a new, highly efficient oxygen-evolving catalyst made of only Earth-abundant materials.

“What’s unique about JCAP is that we’re accelerating the discovery of new materials to a rate that is much faster than has ever been done before in the field of artificial photosynthesis,” says Will Royea, assistant director for strategy and communications at JCAP. “We are also, in parallel, working toward the development of a fully functional device in which all of the components work together to produce fuel safely, efficiently, and cost effectively.”

Those greener pastures may not be so distant after all. —*KF*