Researchers shed more light on conversion of water to hydrogen gas

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Chemists are several steps closer to teasing hydrogen fuel from water using man-made molecular devices that collect electrons and use them to split hydrogen from oxygen.

Electrons are negatively charged particles that allow atoms to react and form bonds. Karen Brewer, professor of chemistry, announced at last August's ACS meeting that her group was able to use light to initiate electron collection and deliver the electrons to the catalyst site where they can be used to reduce water to hydrogen. "Light energy is converted to chemical energy," Brewer said.

In the past year, the group has come up with additional molecular assemblies that absorb light more efficiently and activate conversion more efficiently. "We have come up with other systems to convert light energy to hydrogen. So we have a better understanding of what parts and properties are key to having a molecular system work," Brewer said.

The researchers are working with the Air Force Research Laboratory, which is modeling what happens in the molecular systems after light is absorbed. "The AFRL researchers are interested in how light causes charge separation in large molecular systems. We have been working together to understand the initial stages of the light activation process in our molecular assemblies," Brewer said.

"Previously we concentrated on collecting light and delivering it to the catalyst site. Now we are concentrating on using this activated catalyst to

convert water to hydrogen," Brewer said. "Once we know more about how this process happens, using our supramolecular design process, we can plug in different pieces to make it function better."

Jared Brown, of Salem, Va., presents the poster, "Multielectron photoreduction of mixed metal supramolecular complexes and their application in photochemical hydrogen production" (INOR 138), co-authored by Mark Elvington, of Blacksburg, and Brewer, from 7 to 9 p.m. Sunday, Aug. 28.

Elvington presents the poster, "Supramolecular ruthenium(II), rhodium(III) mixed metal complexes as photochemical molecular devices: Mechanistic studies investigating photoinitiated electron collection (INOR 388), co-authored by Brown and Brewer, from 7 to 9 p.m. Tuesday, Aug. 30.

Poster sessions are in the Washington, D.C., Convention Center Hall A.

ACS summer fellow Shatara Mayfield from North Carolina A&T was awarded a fellowship to spend her summer working on this project.

Source: Virginia Tech