Research group developing a rechargeable magnesium/iodine battery for daily consumer use

March 27 2017, by Katie Doyle

Batteries – can you image how cumbersome the world would be without them? Without any moving parts, batteries convert chemical energy into electricity, making everyday life more expedient. However, lengthy charging times and short overall battery life can be a burden.

Chunsheng Wang, a Professor within the UMD Department of Chemical and Bimolecular Engineering, and his team have developed an alternative to current technology. This new battery chemistry is based on the coupling of a magnesium cathode and an iodine anode. Magnesium batteries have the potential for much higher energy density – roughly 10 times current technology – which translates into longer battery life, saving consumers money in the long run.

"Our mission is to make rechargeable batteries that are cheaper, recharge faster and last longer than what is currently available to consumers," said ChBE Ph.D. Candidate Tao Gao. "Research of magnesium batteries has been ongoing for the last decade, and one of the biggest challenges is decreasing the recharge time, to hours, rather than days."

Dr. Wang's research group approached this issue by combining iodine with magnesium. Iodine is soluble, and it becomes a solid after discharge, quite unlike the solid-state reaction in lithium-ion batteries. This two-phase, liquid-solid reaction is significantly faster than a pure

solid reaction.

"In our research, we have demonstrated that the magnesium/iodine battery can be recharged within 5 min, " said Gao. "This is very important for the direction of next generation battery chemistry because it dramatically decreases the charging time while significantly increasing the energy stored in the battery." Gao and the rest of the team are currently studying the effects of temperature on this battery, to ensure that it can be used in all climates, under all conditions, regardless of application.

This research entitled, "High power rechargeable magnesium/iodine battery chemistry," was published in *Nature Communications* on January 10, 2017.

More information: Huajun Tian et al. High power rechargeable magnesium/iodine battery chemistry, *Nature Communications* (2017). DOI: 10.1038/ncomms14083

Provided by University of Maryland