ASX Announcement
18 March 2015

PEER RECOGNITION OF WORK BY OUR MONASH RESEARCHERS WITH GRAPHENE BASED ENERGY STORAGE BREAKTHROUGH

Strategic Energy Resources Limited (ASX: SER) is pleased to announce, with our graphene company Ionic Industries, that a new breakthrough by our researchers at Monash University has been accepted and published by the respected American Chemical Society (ACS) publications. The paper is titled "Electrochemical Capacitance of Ni-Doped Metal Organic Framework and Reduced Graphene Oxide Composites: More than the Sum of Its Parts" and has appeared in ACS Applied Materials and Interfaces. The breakthrough presents a unique way of converting an insulator into a high performance energy storage material. The project reinforces another application of the wonder material – graphene.

Renewable energy markets are projected to grow rapidly to keep up with the global energy demands and our over-reliance on grid-based energy.

"In our quest to discover new, light weight, high-performance materials for efficient chemical storage of renewable energy, the team at Monash University has discovered that a composite of a porous material, known as Metal Organic Framework, with graphene unexpectedly starts to store chemical energy through a rather unique and efficient redox reaction. Note that redox reactions are part and parcel of most batteries and our recent discovery can unlock the use of graphene in improving the use of renewable energy. In this particular case, graphene plays a supporting role by improving the electrical conductivity of the material." said Dr.Majumder

The Monash team showed that a simple chemical tailoring dramatically improves the charge storage capability of the porous material. Further addition of reduced graphene oxide (rGO) significantly reduces the resistance of the system, improves the power delivery, and enhances the electrochemical capacitance of the system.

"The capacitance of this composite is almost three times larger than the algebraic sum of contributions from the porous material and rGO. An efficient charge transfer process from the synergy between the interconnected graphene nanosheets and the chemically modified porous material realizes materials with energy density of 37.8

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Wh/kg at a power density of 226.7 W/kg and large stability during cycling. These metrics are comparable to current literature standards in Ni-hydroxide based super-capacitors.", said Dr. Parama Banerjee-Chakraborty, the first author of the article.

"These research findings will instigate further research across the wide family of MOFs known today as tuneable energy storage and delivery materials." Dr. Parama Banerjee-Chakraborty went onto say.

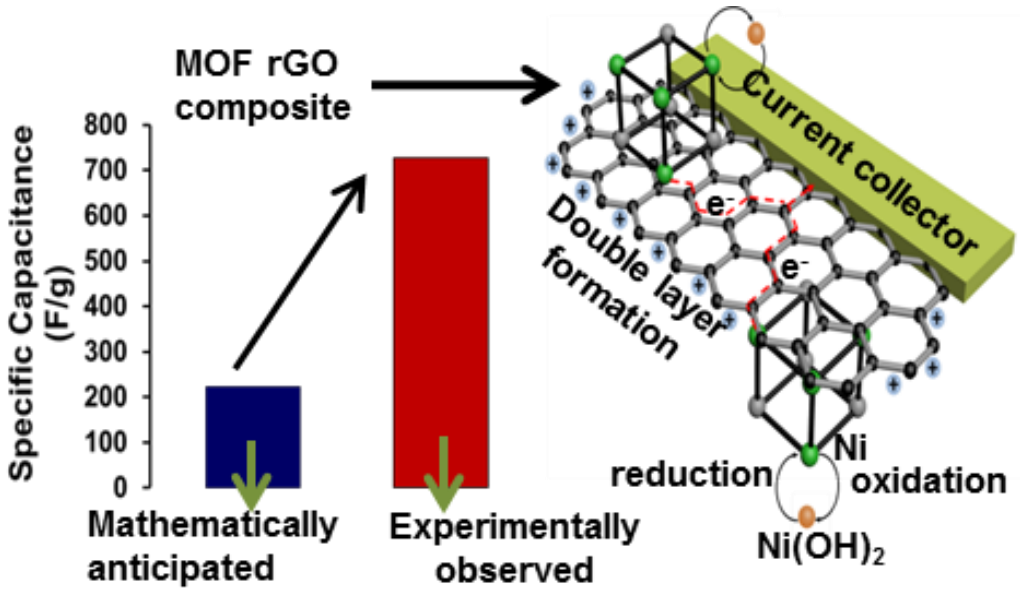

Fig 1. *A novel electrochemical reaction and an electrochemical synergy between the MOF and reduced graphene oxide lead to a charge storage capability three times higher than the mathematically anticipated value*

The Importance of Publication of Academic Papers

Publication is the only way to inform the scientific community and the broader community about our research team's innovations. Just because an academic paper is submitted to a journal does not mean the paper will be accepted. It is peer reviewed by the journal and assessed rigorously for its scientific merits and assessed by peers across the world and only if it is adding to the known literature in a given research area will a paper be published. "This publication opens up a new area of research in the area of electrochemical energy storage and is an important step towards a greener world". Dr. Parama Banerjee-Chakraborty said.

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