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Nanostructured metal oxides from acidic solutions

The demand for electric automobiles is driving research to find new rechargeable battery options. Current lithium ion batteries are very heavy and require large amounts of space. Additionally, these batteries have the potential to overheat during charging and cause fires. Lithium ion batteries are used because they can be recharged, but the charging process causes damage to the batteries from expansion and contraction. There is a need to develop smaller, lighter rechargeable batteries that are durable. Rechargeable batteries are also popular in consumer electronics such as camcorders. There is also a need to be able to store energy on the grid for consumer consumption allowing for continued growth of renewable energy options.

Researchers at Arizona State University have developed a new scalable, cost-effective synthetic method for producing nanostructured metal oxides based on acid solutions of metal precursors. The metal oxide material has potential applications for battery anodes with improved surface features and higher lithium capacity. Other processes use hydrolysis polycondensation where the reaction may happen too fast for certain metals and thus the reactions may not be controllable. This innovation is a synthetic process that overcomes this drawback by performing the reactions in an acidic condition. This allows unstable metal ions to be stabilized.

Potential Applications

- Electric and hybrid cars
- Consumer electronics
- Energy storage systems

Benefits and Advantages

- Lower Costs – Uses low-cost materials
- More Power – Allows for storage of more energy
- Scalable – Process can be used in large scale manufacturing

For more information about the inventor(s) and their research, please see Dr. Dong-Kyun Seo's directory webpage