VCU Innovation Gateway

Laser Synthesis

Process for Graphene-based Magnetic Materials

VCU researchers have developed a simplified method of producing reduced graphene oxide and iron oxide nanocomposite for the removal of heavy metals from wastewater. This composite has been shown to be a strong chelating agent and can also be easily produced in current chemical production practices. In addition to this technique being more efficient and cost effective than standard production methods, the materials can be recycled and reused due to their magnetic properties. This allows companies to significantly reduce the cost of heavy metal removal during wastewater treatment.

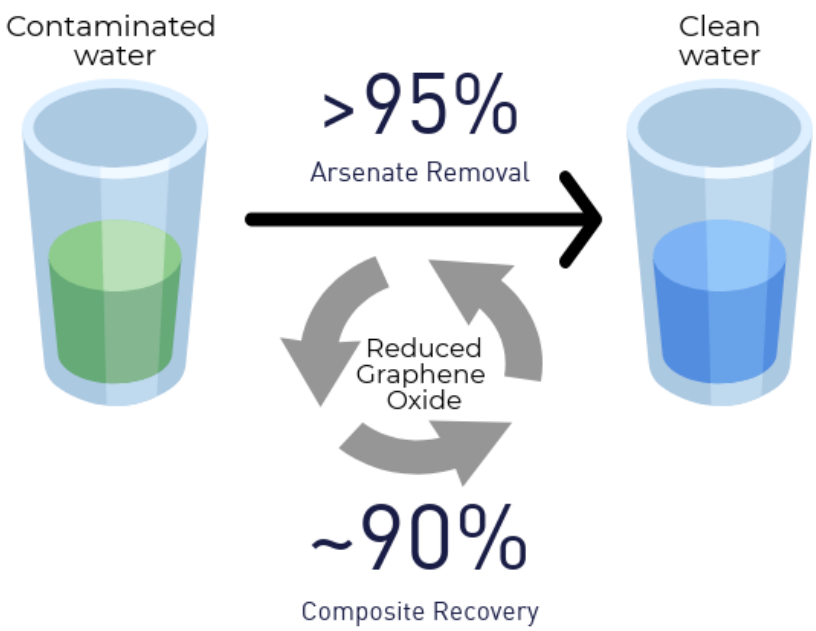
Arsenic and other heavy metal contaminants in water can lead to significant health issues, as well as structural damage over time. Current wastewater treatment industries utilize nanoparticles to adsorb and remove the heavy metals. Processes to produce these nano-particles or nano-sheets can be costly and difficult. VCU's novel method allows for simpler construction of these materials, reducing the cost and difficulty of manufacturing. In addition, these efficient materials are magnetic, allowing for recyclability and reusability.

Benefits

- No necessary additives or solvents
- High efficiency Arsenic removal
- Recyclable
- Low cost

Applications

- Heavy metal removal from wastewater
- Drinking water purification



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The Technology

The technology is based off of a process known as Laser Vaporization Controlled Condensation (LVCC) method. It has shown to produce modified graphene-oxide materials capable of efficiently removing Arsenate from wastewater. This process is specific to the production of magnetite-graphene-oxide materials. The process does not require the use of additives or solvents, allowing for simple implementation and production. Due to the high chemical stability of this compound, recycling of the material extends the usability and efficiency of the treatment. VCU is seeking market insights on commercialization of this new nanoparticle production method. We welcome interest from potential partners and licensees.

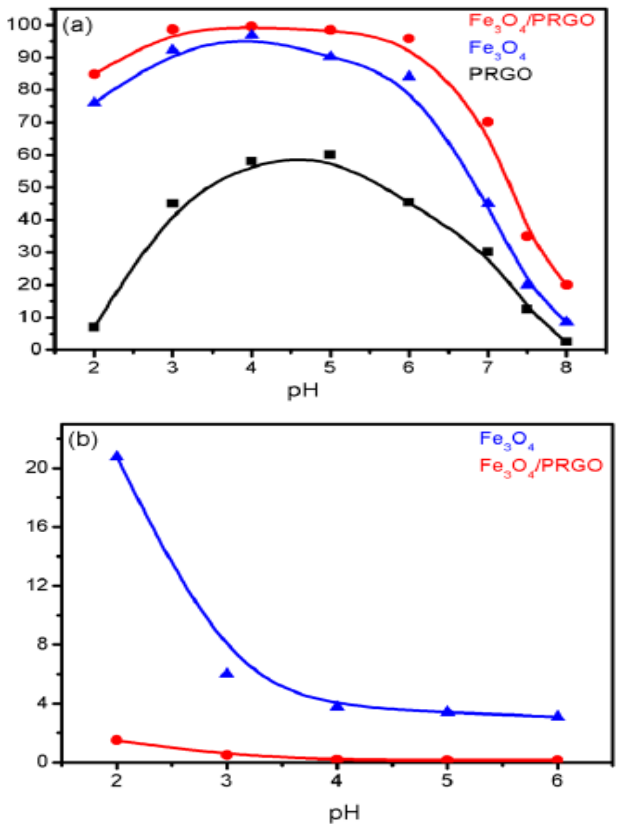

Figure 1: (a) Percent removal of Arsenic at varying pH.
(b) Amount of Fe leeched from the material at varying pH

Additional information

Patent status:
Patent Pending; U.S. and foreign rights available

License status:
This technology is available for licensing to industry for further development and commercialization

Category:
Waste Water Management;

VCU Tech #:
17-124

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