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Nanoscale carbon dots for PFAS phytoremediation

A method for the phytoremediation of PFAS from contaminated soil using carbon-based nanoparticles.

IP Status: Provisional Patent Application Filed

Applications

- Environmental cleanup
- PFAS remediation

Key Benefits & Differentiators

- **Effective at capturing a broad range of PFAS :** Nanoscale carbon dots are effective for the capture of short and long chain PFAS
- **Tunable surface:** Easily modified for desired functions

Technology Overview

Per- and poly-fluoroalkyl substances (PFAS) are a class of chemicals known as “Forever Chemicals” which bioaccumulate and are toxic to humans. Due to their widespread use in industry, contamination of soil and groundwater with PFAS has become common. PFAS are extremely persistent in the environment and are challenging to degrade or remediate due to their high stability and mobility. Further complicating the issue, they are present in contaminated areas as complex mixtures containing both long and short chain PFAS. Current remediation methods are limited, and are either very costly, or not applicable to remediate all types of PFAS.

Researchers at the University of Minnesota have developed a new method to remediate a broad range of PFAS from soil and water using nanoscale carbon dots (CDs). This technology enhances the phytoremediation of PFAS by using carbon-based nanoparticles that have a demonstrated affinity for PFAS in water. These nanoparticles can be uptaken by plants, and promote the movement of both short chain and long chain PFAS from the roots to the above ground tissues which in turn facilitates PFAS removal. The ability to remediate a wide range of PFAS is critical for environmental cleanup efforts and separates this technology from traditional phytoremediation techniques which only work for the smallest PFAS molecules.

Phase of Development

TRL: 3-4
Proof of concept - nanoscale CDs have been shown to uptake selected PFAS.

Desired Partnerships

This technology is now available for:

Technology ID
2023-156

Category
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Press Releases

TEDx Minneapolis December 9, 2022

Researchers

- **Christy Haynes, PhD** Distinguished McKnight University Professor, Department of Chemistry

References

1. Riley E. Lewis, Cheng-Hsin Huang, Jason C. White, and Christy L. Haynes , https://pubs.acs.org/doi/full/10.1021/acsnanoscienceau.3c00022, https://pubs.acs.org/doi/full/10.1021/acsnanoscienceau.3c00022