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Microwave-Enabled Thermal Remediation of Organic Chemical Contaminated Soils using Dielectric Nanomaterials as Additives

Every year high volumes of hazardous organic pollutants, such as long-chain petroleum hydrocarbon, contaminate aquatic and soil ecosystems. This occurs because heavy compounds are less prone to natural weathering processes such as, volatilization, biodegradation, and dissolution. Furthermore, these pollutants harm the environment, animals, and humans living near the contaminated areas. Clearly, there is a need to overcome this problem to protect the earth and its inhabitants.

Researchers at ASU have developed a unique process to reduce, and possibly remove, persistent organic chemicals from contaminated soils. The process begins by using dielectric carbon nanomaterials as additives during microwave (MW)-enabled thermal remediation. Microwave-enabled heating volatizes organic contaminates, removing them from soil. This process exhibits promising characteristics such as high removal efficiency, and no secondary pollution. Additionally, it is suitable for treating various organic pollutants with different chemical compositions and structures.

Potential Applications

- Soil Remediation
- Oil Spill Clean Up

Benefits and Advantages

- More Efficient Heating of Soils – Dielectric additives augment localized heating which further enhances:
  - Decomposition of polar and polarizable hydrocarbon components and enhances evaporation
  - Evaporation of volatile components regardless of their affinity to microwave energy because of locally heated regions of the surrounding environment
  - Co-evaporation of non-volatile components that can be stripped with the steam generated from evaporation of water molecules

For more information about the inventor(s) and their research, please see

Dr. Paul Westerhoff's Directory Page