Docket #: S19-402

Organic Wastewater Treatment Using Single-Atom Catalytic Fenton Filters and Electrolytically-Generated H2O2

A novel wastewater treatment system that couples a single-atom catalytic filter and H2O2 electrolytic generator to remove organic contaminants. Advanced oxidation processes (AOPs) utilize hydroxyl radicals to treat contaminated water, but currently require substantial chemical and energy inputs to generate the radical. Here, copper surrounded by a carbon nitride network allows for single-atom catalytic generation of the radicals, while the heterogeneous support removed the need for subsequent filtration to maintain 100% contaminant removal efficiency after 200 h of operation. This process also requires H2O2, which is electrolytically generated on site in a three-chamber flow reactor with novel gas diffusion electrode and catalysts. As a result, 10 g/L of H2O2 solution is continually produced at $0.005/L, well below current costs. In sum, this technology encompasses a low-cost method to treat organic contaminated wastewater, especially in remote areas or isolated communities.

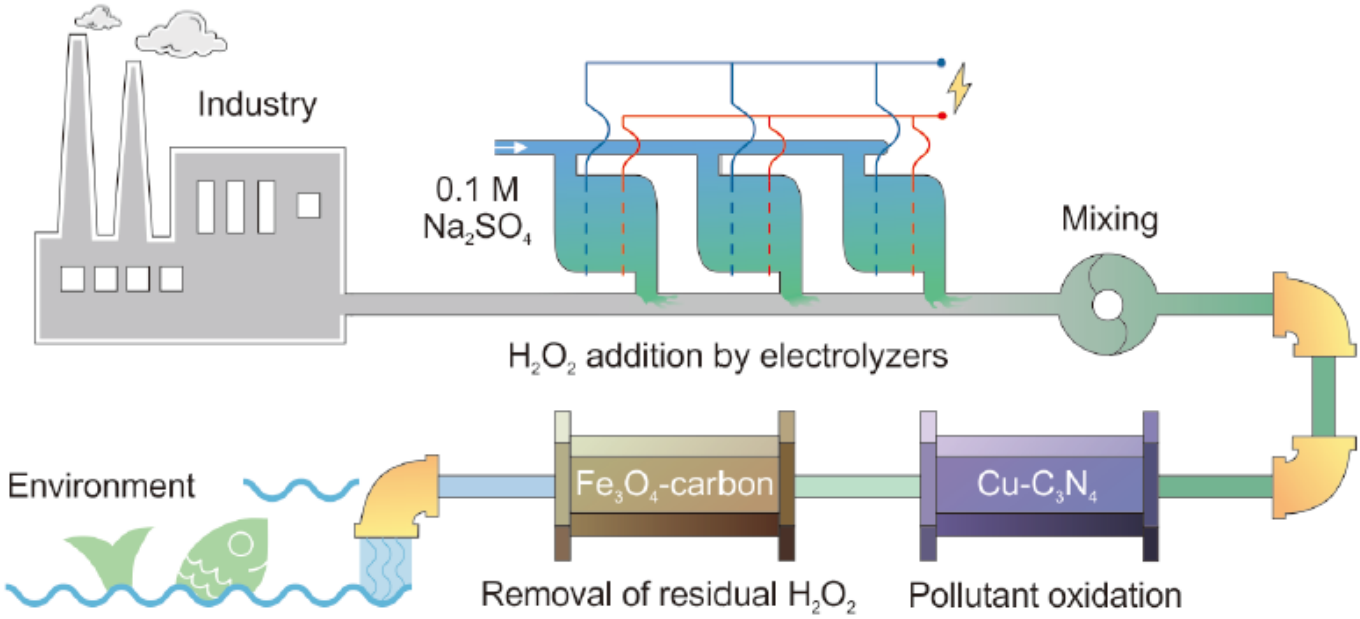

Photo description: Schematic of the wastewater treatment system, specifically addressing production and activation of H2O2.

Stage of Research

- Proof of concept

Applications

- **Organic wastewater treatment**
- On-site H2O2 production

Advantages

- **Maintain 100% contaminant removal efficiency after 200 h of operation.**
- Lower energy cost
- Fewer chemical input demands
- Suitable for remote areas or isolated communities

Patents

- Published Application: 20210230030
- Issued: 12,012,345 (USA)

Innovators

- Yi Cui
- Jinwei Xu

Licensing Contact

Jon Gortat

Licensing & Strategic Alliances Director for Physical Science

Email