外來入侵植物銀合歡所製備磁性生物炭於文蛤養殖水體中之氨氮及硫化物吸附行為

Ammonia and Sulfide Adsorption Behaviors of *Leucaena leucocephala* Derived Magnetic Biochar in Hard Clam Farming Water

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摘要

Due to the increasing farming density, the damage caused by ammonia (ammonia) and hydrogen sulfide (sulfide) to the hard clam (*Meretrix lusoria*) farming has become a significant concern. Particularly, techniques development for water quality improvement is crucial and urgent. Biochar is a porous carbonaceous adsorbent typically derived from waste biomass or organic matter, is a uniquely renewable material for pollution control. Due to its long-term half-life (over 1000 years), biochar is recognized as a product of carbon sequestration. Addition of magnetic material (e.g., nano/microscale magnetite, Fe_3O_4) to biochar facilitates its separation from aqueous solution after use. The combination of carbonization and impregnation into a single heating step is more rapid and straightforward than traditional biochar pyrolysis with functionalization and metal impregnation. *Leucaena leucocephala* is a small tree native to Mexico that is an aggressive colonizer of secondary or disturbed vegetation within and beyond its native range throughout the Americas, and has been regarded as a major invasive species in many countries in tropical Africa, Asia, and Oceania. Notably, *Leucaena leucocephala* stem is suitable to be utilized as biochar precursor because of its physical properties and cellulose structure. Thus, this work aims to use *Leucaena leucocephala* as biomass to prepare the magnetic biochar (MBC) for the removal of ammonia and sulfide, further improving the water quality of the hard clam farming pound. The results of this work demonstrate that the preparation procedure employed is effective for preparing MBC from *Leucaena leucocephala*. Specifically, the sample (MBC600) prepared at 600 °C exhibits a high specific surface area (S_{BET}) of 474.2 m^2/g and a robust microporosity (0.727). Particularly, MBC600 demonstrates superior removal ability for both ammonia and sulfide when compared to materials prepared at other conditions. The removal of ammonia was possibly driven via the reduction to N_2 gas, while sulfide was chemically adsorbed on the surface of MBC600. Furthermore, in the absence of salinity interference, the removal of sulfide was higher (16.8 %) than that of the ammonia. However, within the typical salinity (30 ‰) of seawater, MBC600 effectively removed ammonia, but it did not significantly adsorb sulfide. Overall, these findings suggest that MBC600 has a great potential for improving the water quality of *Meretrix lusoria*.

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