Research on Hydrophobicity and Lipophilicity of Wood Decomposed by Brown Rot Fungi and Its Potential Application as an Oil Absorbent

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Oil spills pose significant threat to all environmental, political, economic aspects in global settings. However, current oil absorbents that are most commonly used are made of polypropylene, which may result in secondary pollution in the process of reclamation and incineration. Thus, there has been a growing effort in developing biodegradable oil absorbents, but those yet fail to completely remove oil. Therefore, this research attempts to absorb oil perfectly with an eco-friendly powder form oil absorbent using wasted pine wood decomposed by brown-rot fungi. This by-product is highly composed of lignin, a phenolic compound that accounts for approximately 25~40% of wood biomass, and shows particular change from hydrophilicity to hydrophobicity when heated. This property change after heat treatment is due to changes in chemical composition as well as lignin structure. When lignin content exceeds 40 percent, it shows clear hydrophobicity, and in general, as lignin content increases, hydrophobicity increases. With strong hydrophobicity, lipophilicity, and buoyancy, heated wood decomposed by brown rot fungi serves as a good material for an eco-friendly oil absorbent. There is more significance in this discovery for the sample has merely been heated, not burnt to ashes. By exploring lignin's properties, this research suggests an alternative to the current use of lignin as an eco-friendly oil absorbent. Instead of modifying it into salt form through acid-base reactions, lignin can be utilized as its pure form through the use of microorganisms, and this introduces a new way of recycling waste wood as well as facilitating the development of innovative materials using lignin and ultimately provides a solution to the environmental problems.

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Third Award of $1,000