

# Cellulose Based HIPE Templated Scaffolds for Efficient and Eco-Friendly Oil Sorption

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**Abstract:** Addressing oil spills and their environmental impact has typically relied on different methods, including the use of synthetic polymer-based hydrophobic absorbents. Although these materials are efficient, their non-biodegradable nature poses a problem as it raises concerns regarding their disposal and the potential for additional contamination. To address these problems, this study proposes an innovative approach of fabricating an oleophilic porous scaffold from a natural polymer, cellulose, for oil absorption. This process involves emulsion templating, where cellulose from pre-treated wood pulp forms an oil/water high internal phase emulsion (HIPE). Factors such as solvent selection, emulsifiers, and dispersed phase properties are optimized to develop the emulsion. The resulting scaffold, crosslinked during fabrication, exhibits enhanced durability and stability across multiple oil absorption and desorption cycles. Its interconnected porous structure allows for a high oil sorption capacity

and volumetric swelling, comparable to hydrophobically modified cellulosic materials. The scaffold's oleophilic characteristics as well as intricate micro-pores allow it to retain its structure and overall efficiency for five cycles. The study suggests exploring hydrophobic functionalization to further enhance the scaffold's effectiveness, opening up possibilities for diverse applications.

## REFERENCES

- [1] Kumar, A., Kumar, D., Rani, S. *et al.* Emulsion templated cellulosic porous scaffolds of superior oleophilicity. *Cellulose*. 2023. <https://doi.org/10.1007/s10570-023-05425-z>