Synthesis of alkyne-functionalized cellulose for attachment of (bio)molecules *via* click reaction

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1. INTRODUCTION

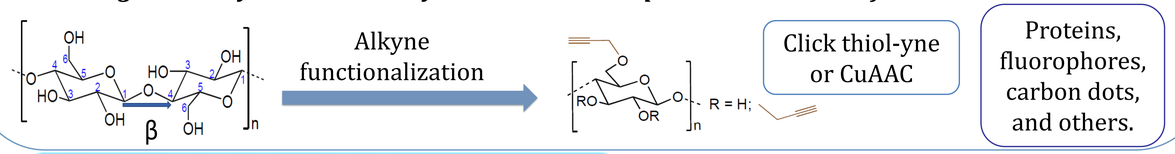
➢ Cellulose is among the most abundant natural polymers and has distinct properties that make it unique, including:

- ✓ Low extraction cost;
- ✓ Renewable sourcing;
- ✓ Biocompatibility;
- ✓ Biodegradability.

Chemical functionalization can broaden its applications.

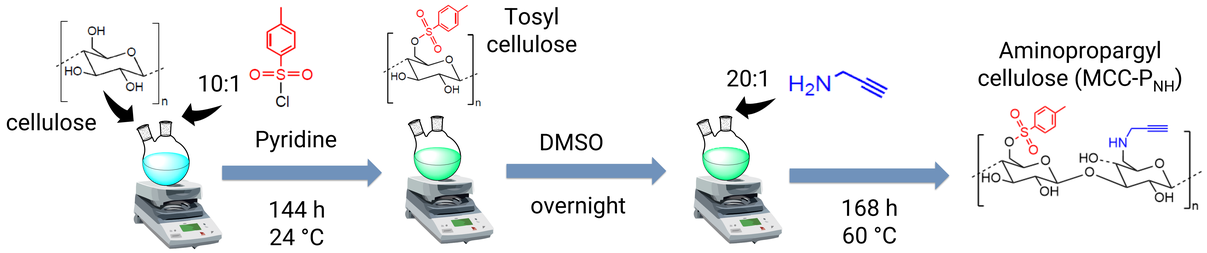
Propargylation enhances compatibility with various click reactions, such as CuAAC and thiol-yne.

➢ ***Our main goal is to synthesize an alkyne derivative to expand cellulose modifications via click reactions.***

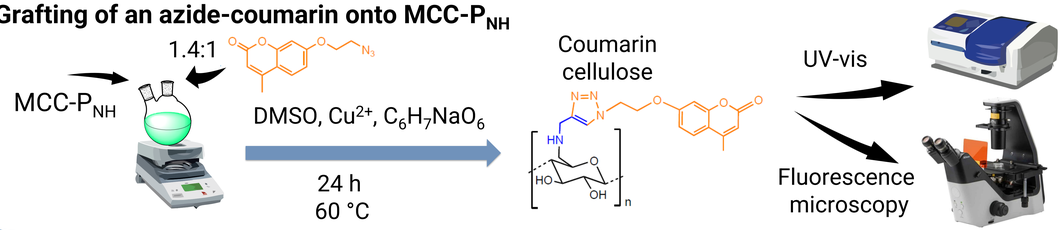


2. MATERIALS ADN METHODS

I. Alkyne-functionalization of cellulose (MCC-P_{NH})

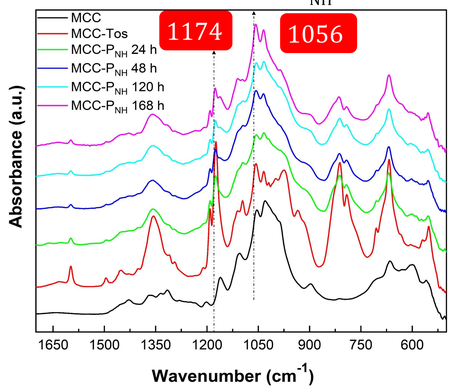


II. Grafting of an azide-coumarin onto MCC-P_{NH}



3. RESULTS AND DISCUSSION

Fig 1– ATR-FTIR spectra of MCC, MCC-Tos, and MCC-P_{NH}



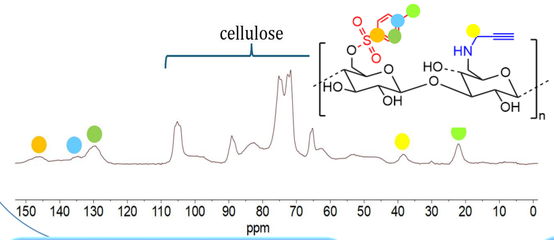
1st – Optimization of tosylation reaction:

- ✓ ***DStos = 1.80 under heterogeneous conditions;***

2nd – Alkyne functionalization:

- ✓ ***Substitution of tosyl groups by aminopropargyl with a decrease of around 61% in tosyl groups (Fig 1);***
- ✓ ***^{13}C-NMR showed a signal at δ 40 ppm from the C-NH bond (Fig. 2).***

Fig 2 – CP/MAS ^{13}C-NMR spectra of MCC-P_{NH}



3rd – Attachment of a coumarin:

- ✓ ***DS_{PNH} = 0.21 (Fig. 3);***
- ✓ ***uniform distribution of the azide dye throughout the fibers (Fig. 4)***

Fig 3 – UV-vis spectra for a solution of azide-coumarin and for MCC-P_{NH}/azide-coumarin.

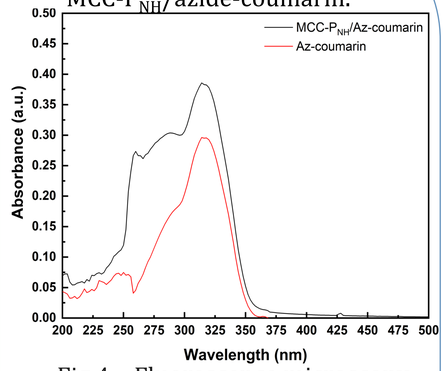
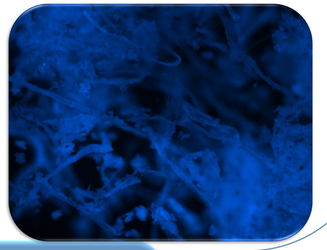


Fig 4 – Fluorescence microscopy image of MCC-P_{NH}/azide-coumarin.



4. CONCLUSIONS

➢ This research enables the creation of high-value materials from a renewable polymer such as cellulose;

➢ MCC-P_{NH} + click chemistry = developing eco-friendly materials such as protein/enzyme bioconjugates, composites, and other advanced materials.

5. ACKNOWLEDGMENTS

CNPq, Finep, ICENP, CAPES, ProPP, RQ-MG

For more information

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