

## Accepted Manuscript

The effect of lignin on the reactivity of natural fibres towards molecular fluorine

M. Pouzet, M. Dubois, K. Charlet, A. Béakou

PII: S0264-1275(17)30112-0  
DOI: doi: [10.1016/j.matdes.2017.01.086](https://doi.org/10.1016/j.matdes.2017.01.086)  
Reference: JMADE 2727  
To appear in: *Materials & Design*  
Received date: 8 December 2016  
Revised date: 25 January 2017  
Accepted date: 27 January 2017



Please cite this article as: M. Pouzet, M. Dubois, K. Charlet, A. Béakou , The effect of lignin on the reactivity of natural fibres towards molecular fluorine. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Jmade(2017), doi: [10.1016/j.matdes.2017.01.086](https://doi.org/10.1016/j.matdes.2017.01.086)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

## The effect of lignin on the reactivity of natural fibres towards molecular fluorine

M. Pouzet<sup>1,2,3,4</sup>, M. Dubois<sup>1,2\*</sup>, K. Charlet<sup>3,4</sup>, A. Béakou<sup>3,4</sup>

<sup>1</sup> Université Clermont Auvergne, Institut de Chimie de Clermont-Ferrand, BP 10448, 63000 Clermont-Ferrand, France

<sup>2</sup> CNRS, UMR 6296, ICCF, 63178 Aubière, France

<sup>3</sup> Université Clermont Auvergne, SIGMA Clermont, Institut Pascal, BP 10448, 63000 Clermont-Ferrand, France

<sup>4</sup> CNRS, UMR 6602, IP, 63178 Aubière, France

### Abstract

In this study, a range of natural fibres and their main components have been treated by direct fluorination using F<sub>2</sub> gas. Fourier-Transform infrared spectroscopy, <sup>19</sup>F solid state Nuclear Magnetic Resonance and tensiometry results underline the substitution of –OH groups by fluorine atoms and thus the formation of C-F covalent bonds. Fluorination induces a significant decrease in the hydrophilic properties in the case of lignocellulosic materials. The relationship between the chemical composition of the natural fibres and their reactivity during fluorination has been established. Indeed, on the one hand, the affinity for F<sub>2</sub> is improved by the presence of lignin, leading to a better conversion of C-OH into C-F bonds. On the other hand, a high cellulose content tends to inhibit the reaction. As a consequence, the cellulose and lignin contents of wood materials can be determined thanks to their reactivity during fluorination. However, for high-content cellulose materials, estimating the cellulose and lignin contents by this method is more difficult because of their low reactivity during fluorination. In this case, a thermal assisted fluorination is necessary to increase reactivity and thus classify samples according to their cellulose content.

**Keywords:** wood, fluorination, lignin, cellulose, hydrophobicity, spectroscopy

---

\* Corresponding author at : Université Clermont Auvergne, Institut de Chimie de Clermont-Ferrand, BP 10448, 63000 Clermont-Ferrand, France  
E-mail address : marc.dubois@univ-bpclermont.fr

Download English Version:

<https://daneshyari.com/en/article/5023568>

Download Persian Version:

<https://daneshyari.com/article/5023568>

[Daneshyari.com](https://daneshyari.com)