# SYNTHESIS AND CHARACTERIZATION OF A FLUORESCENT DERIVATIVE OF PMVEMA WITH PYRENE

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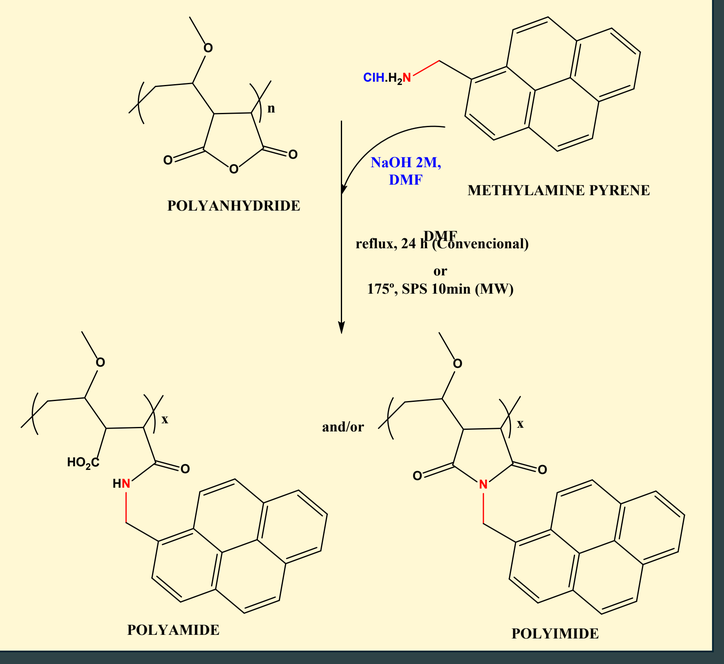
## INTRODUCTION

Poly(methyl vinyl ether-alt-maleic anhydride) (PMVEMA) is a versatile polymer known for its properties such as biodegradability and biocompatibility, making it suitable for biomedical applications. Furthermore, its use as a base polymer for the synthesis of nanofibers via electrospinning has already been described. Its derivatization with fluorescent moieties, such as pyrenes, opens new fields of application. In this work, a derivative of the PMVEMA polymer with pyrene (PMVEMA-Pyr) was synthesized, characterized and used for nanofiber synthesis through electrospinning.

## SYNTHETIC SCHEME




## METHODOLOGY

Pyrene 1-pyrenemethylamine was incorporated into the PMVEMA backbone via post-polymerization modification reaction through nucleophilic attack. The molar ratio of PMVEMA to pyrene in the reaction was 2:1. The chemical structure, thermal property, and photophysical performance were analyzed. Nanofibers were synthesized via electrospinning using a blend of PMVEMA-ES 50% w/w in ethanol and PMVEMA-Pyr 5% w/w in DMSO.

Nuclear Magnetic Resonance (NMR)

Fourier Transform Infrared Spectroscopy (FTIR)

Absorbance and emission spectra

Thermogravimetric analysis (TGA)

## RESULTS

### NMR

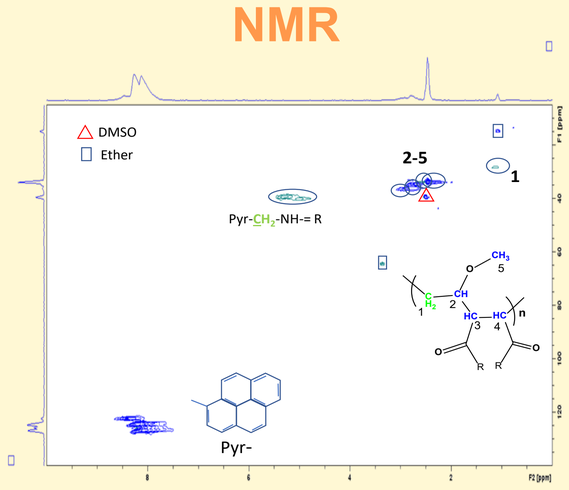



**Figure 1.** $^{1}H–^{13}C$ HSQC spectrum of PMVEMA-Pyr in DMSO-$d_6$ (as internal reference). Solvent signals were showed (square and triangle).

### UV-vis

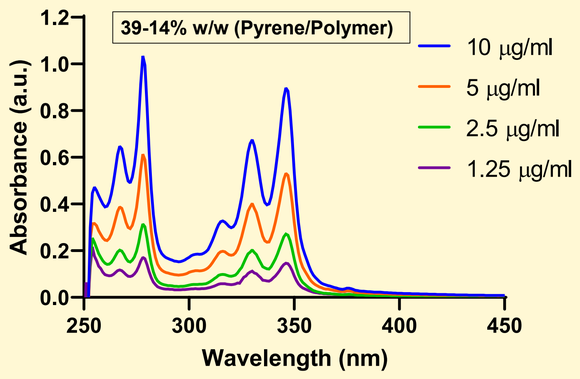



**Figure 2.** UV-vis absorption spectra of PMVEMA-Pyr in DMSO at different concentrations. The main absorption peaks are found at 267, 278, 330 and 346 nm and correspond to the characteristic absorption bands of pyrene.

### Excitation and emission

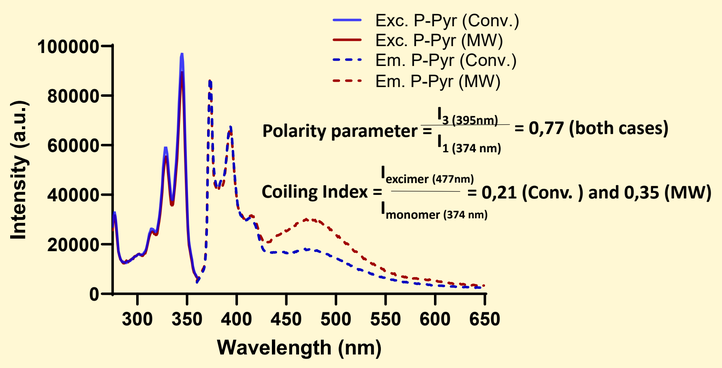



**Figure 3.** Excitation and emission spectra of PMVEMA-Pyr obtained via conventional and microwave assisted synthesis. Two main peaks are observed at 377 and 398 nm, and a broad excimer emission band around 480 nm.

### FTIR

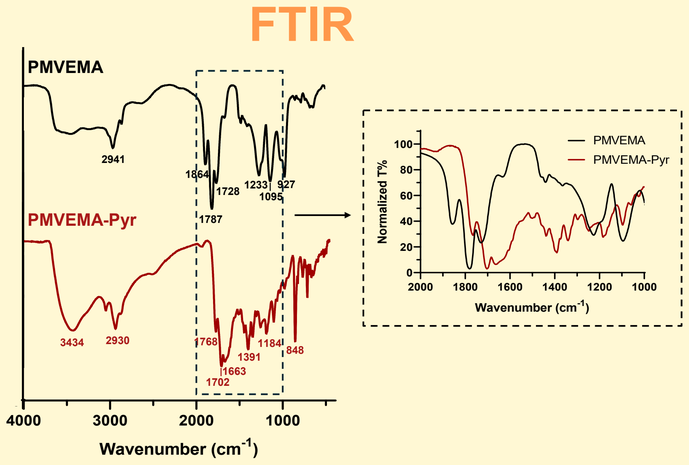



**Figure 2.** FTIR spectra of PMVEMA-Pyr. The peaks at 1900-1600 $cm^{-1}$ in PMVEMA can be attributed to the asymmetric vibrations of the carbonyl C=O groups. However, these peaks are shifted to the right in the PMVEMA-Pyr spectrum, which may be due to the transformation into amide groups.

### TGA

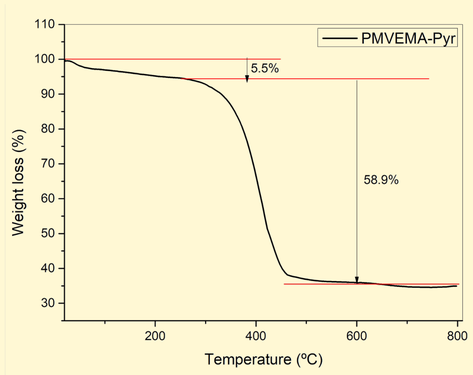



**Figure 5.** TGA-DGT curve of PMVEMA-Pyr. The main decomposition stage occurs at around 270 and 550 °C with a mass loss of 58.9%.

### Nanofibers

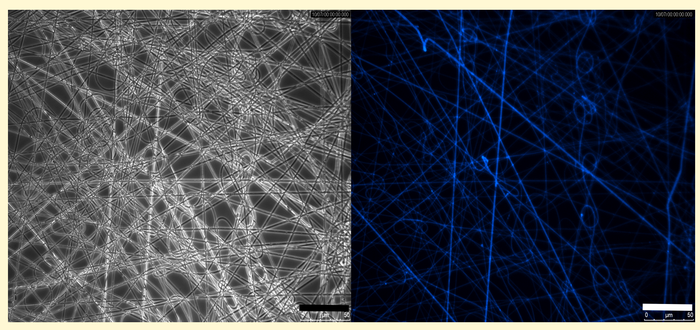


**Figure 6.** Fluorescent microscopy images of the PMVEMA-ES/PMVEMA-Pyr nanofibers. Scale bar: 50 µm.

## BIBLIOGRAPHY

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## CONCLUSIONS

- PMVEMA derivative with pyrene (PMVEMA-Pyr) was achieved via conventional synthesis and MW assisted synthesis.
- The different characterization methods confirmed the formation of PMVEMA-Pyr.
- No differences were found between the products obtained using the two types of synthesis, however MW synthesis allows for faster product acquisition.
- Fluorescent nanofibers were synthesized via electrospinning using a blend of PMVEMA-ES and PMVEMA-Pyr.
- Further studies will involve the determination of the biological effects of PMVEMA-Pyr and PMVEMA-Pyr nanofibers.

## ACKNOWLEDGEMENTS

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