

A micromechanical approach to the behaviour of the fibre/matrix interface in flax/epoxy composite materials

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Context and objectives

- Physico-chemical interactions and complex mechanisms between the flax fibres and organic thermosetting polymer matrix leading to the formation of an interphase zone with distinct properties
- ⇒ Determine the mechanical properties of the interface at the nanoscale and get a better understanding of the physico-chemical phenomena at the sub-micron scale

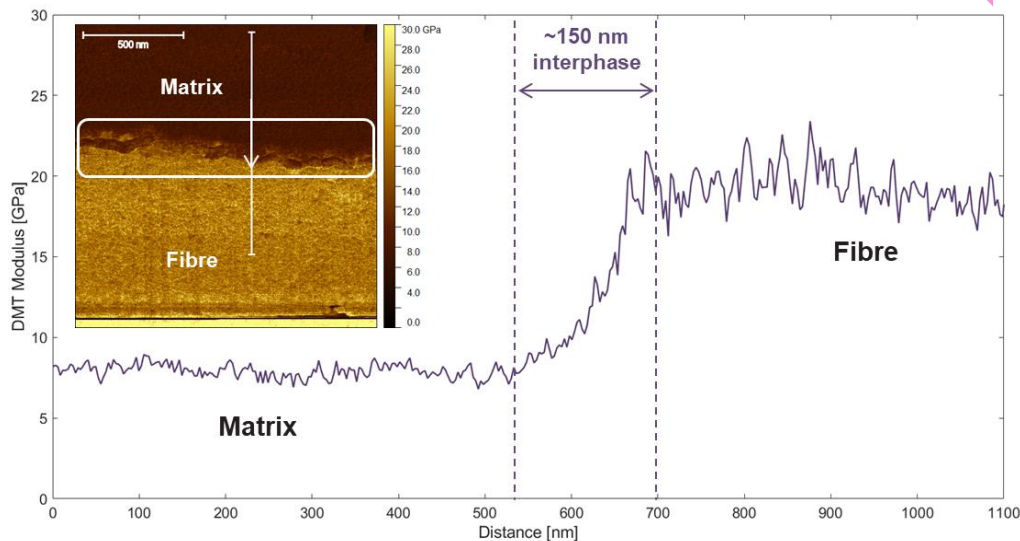
Methodology

Correlative spectro-mechanical approach

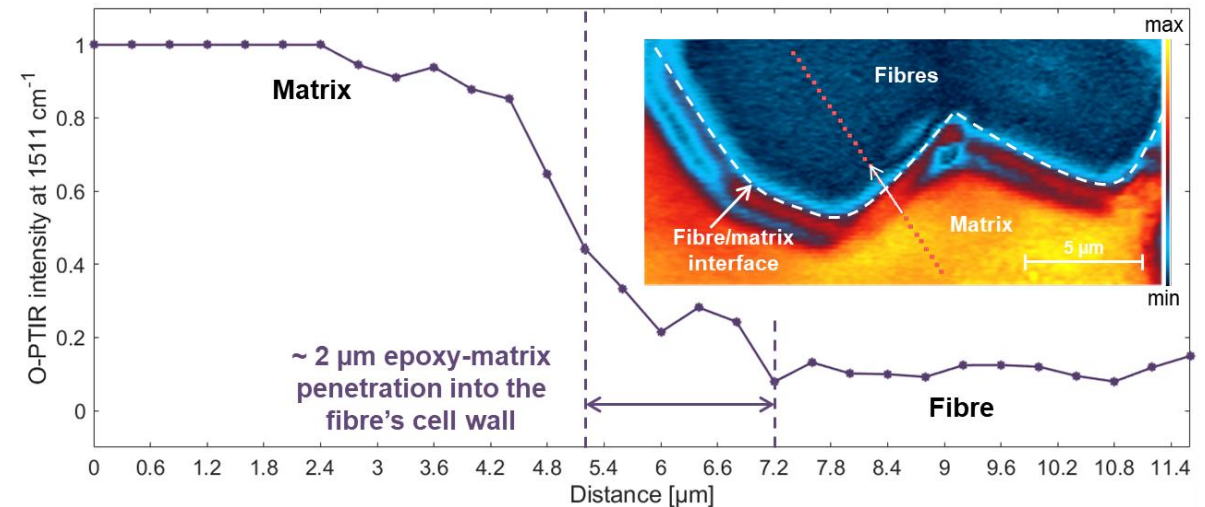
Nanomechanical AFM mappings

Coupling

Sub-micron O-PTIR chemical mappings



DMT Modulus mapping at the fibre/matrix interface [1]



O-PTIR chemical mapping at 1511 cm⁻¹ (epoxy matrix marker) [2]



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[1] Arafat I. et al. Ultra-Thin interphase in Flax/Epoxy composites revealed by AFM PF-QNM Nanomechanics. *Compos Part Appl Sci Manuf* 2026; 204: 109602.

[2] Arafat I. et al., Towards a better understanding of the fibre/matrix adhesion in flax/epoxy composites. In: Proceedings of the 22nd European Conference on Composite Materials (ECCM22); 21–25 Jun 2026; Oslo, Norway.