EFFECTS OF EUCALYPTUS FIBRE SURFACE PROPERTIES ON THE MICROSTRUCTURE OF CEMENT BASED COMPOSITES

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Abstract.

The objective of the present work is to evaluate the effects of the surface properties of the unrefined eucalyptus pulp fibres to their performance in cement based composites. Unbleached pulp presents a thin layer on the fibre surface that is rich in lignin, hemicellulose and extractives. Such a layer acts as a physical and chemical barrier to the cement attack and consequently reduces its penetration into the fibres' cell wall. The lower polar contribution to the surface energy of the unbleached fibres suggests that these fibres are less hydrophilic than their bleached counterpart. Atomic force microscopy (AFM) reveals the changes that occur on the fibre surface after pulp bleaching and contributes to understand the quality of the resulting fibre-cement interface. Pulp bleaching improved the fibre/cement interfacial bonding, while fibres in the unbleached pulp were less susceptible to the re-precipitation of cement hydration products into the fibre cavities (lumens).