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Microdistribution of Tin in Newly Synthesized Organotin(IV)-Treated Tropical Wood Cells

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ABSTRACT
Penetration of wood preservatives into the wood cell is believed to be important to protect the wood from biodegradation especially fungal degradation. Preservatives effectiveness depends on the amount of uptake or retention as well as its uniform distribution within the wood cells. Interest on organotin(IV) complexes both mono- and disubstituted organotin(IV) is increasing due to their interesting structural features, biocidal properties and environmentally friendly. The microdistribution of tin-based preservative in tropical woods was examined using Scanning Electron Microscope-Energy Dispersive X-ray (SEM-EDX) analyzer. Bulk specimens of 1% organotin(IV)-treated cubes were used to examine the microdistribution of tin in *Alstonia scholaris*, *Macaranga triloba* and *Hevea brasiliensis* woods. Conventional SEM-EDX was able to detect spatial distribution of tin in wood microstructure. The SEM-EDX distribution maps and linescan analyses showed that the deposition of tin were uneven with respect to cell microstructure in all woods studied with relatively higher tin accumulation in the ray cells and middle lamella than in the fibre cell wall. The results indicated that ray as the penetration pathway of organotin(IV) solution into the wood microstructure capable of penetrating the cell wall.

Key words: Organotin(IV) complexes, SEM-EDX analysis, microdistribution, tropical woods

INTRODUCTION

Organotin(IV) compounds are chemical compounds based on tin with hydrocarbon substituents. The chemistry of organotin(IV) compounds continues to be of interest due to their interesting structural features and also because of their potentials as agricultural biocides, antitumor agents and other biological activities which are currently being investigated by many researchers (Singh and Kaushik, 2008; Benetollo *et al*., 2005). In recent years, organotin(IV) compounds have been used extensively as agrochemical fungicides, biocides and antifouling agents (Hanif *et al*., 2010).

Various chemicals are impregnated into wood during preservative treatment. The effectiveness of preservatives depends not only upon the amount of uptake or retention, but also upon its uniform distribution in the wood cells (Zhang and Kamdem, 2000). The efficacy of preservatives is also the function of its performance in wood affected by preservative microdistribution. For instance, the excellent performance of CCA-treated softwood, particularly the *Pinus* species, is attributed to deep penetration of preservatives into the cell wall of tracheids, preservative loading, uniform preservative distribution at cell level and even preservative distribution within the cell wall (Ryan and Drysdale, 1988;