Biomass-Based Monitoring of Heavy Metals

Joshua P. Adams\textsuperscript{1}, Erdem Topsakal\textsuperscript{2}, and Cetin Yuceer\textsuperscript{3}

\textsuperscript{1}Graduate Student and \textsuperscript{3}Assistant Professor, Department of Forestry and \textsuperscript{2}Assistant Professor, Department of Electrical Engineering, Mississippi State University, Mississippi State, MS, USA

New developments in biotechnology provide for heavy metal removal and monitoring. Hyper-accumulating plants such as \textit{Thlaspi caerulescens} express genes amplifying heavy metal absorption and detoxification. These small plants are not practical for large-scale remediation. Current technology allows gene transfer and expression into high-biomass plants such as \textit{Populus}. This would be beneficial since \textit{Populus} has silvicultural systems for establishment, culture, protection, and harvest. Furthermore, \textit{Populus} can be transformed into a real-time monitoring system by fusing heavy metal proteins with fluorescent proteins (FP). Metal concentration would be detected through FP-produced light changes measured by an optical sensor. Subsequently geographical positioning (GPS)/global system for mobile communication (GSM) technology can be used to transfer this information to a central location for monitoring.