



Characterization of Particulate Matters Emitted from Biomass Combustion using Electron Microscopy and Energy Dispersive X-ray Spectroscopy

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Abstract. Particulate Matters (PMs) emitted from biomass combustion including open burning of biomass agricultural residues and forest fires must be reduced to protect both human health and environment. The physical characteristics of morphology, elemental composition and nanostructure of particulate matters generated from biomass combustion were successfully investigated by using electron microscopy and energy dispersive X-ray spectroscopy (EDS) analysis with Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM), and thermogravimetric analysis (TGA) was used to analyze the oxidation kinetics on particulate matters. Before biomass burning, it was found that about 65% of carbon fraction in biomass raw material while 95% of carbon fraction in soot and 84% in ash particles after burning. The average diameter size of single primary particles is approximately 36 nm. Nanostructure of single primary particle of biomass soot is mainly composed of curve line crystallites while metallic ash nanoparticle is composed of straight-line hatch patterns. The interplanar spacing of fringes of biomass soot and ash crystallites is 0.36 nm and 0.28 nm, respectively. This article aims to study the different nanostructure of biomass forest leaves residual ash and soot such as agglomerated particles, primary particle's measurement using TEM image analysis.

Keywords: Biomass, Particulate Matter, Soot, Ash, TEM