

Characteristics of Sulfite-Rich Scrubber Materials and Potential Value-Added Materials from Them

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ABSTRACT

Among the coal combustion byproducts produced, FGD sulfite-rich scrubber material has found very few uses and typically costs electric utilities resources to dispose this byproduct. We have initiated research in which we are systematically characterizing the sulfite-rich scrubber materials and attempting to exploit the physical and chemical characteristics of them to formulate value-added products. In this presentation we report the structural, thermal, and thermomechanical characteristics of the scrubber materials obtained from two different power plants burning Midwestern high sulfur bituminous coal. Moreover, we examined the behavior of mercury in the scrubber materials especially under value-added product manufacturing conditions. Surprisingly, our results suggested that mercury was not uniformly distributed within scrubber material, and its concentration ranged from ~ 360 µg/kg to ~ 410 µg/kg depending upon from where the samples were extracted for analysis. Mercury concentrations also varied in the stored scrubber material by depth, though variations were random. In our value-added product manufacturing, the scrubber materials may be exposed to temperatures as high as 250°C, and our results indicated that at ambient pressures about 33% of mercury from scrubber material might be re-emitted. However, subjecting the scrubber material to pressure significantly modified the mercury emission at higher temperatures and mitigated any potential concerns associated with its emission. The SEM, TEM, DSC, TGA, DTA, XRD, and FTIR measurements on the sulfite-rich scrubber materials exposed to product manufacturing conditions suggested that the materials have the requisite characteristics to form value-added products from them. Research supported by DOE-NETL (DE-FG26-06NT42689) and ICCI (DEV05-4).

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