New Strategies in the Utilization of FGD Gypsum and Sulfite-rich Materials

Vivak M. Malhotra[1] and Francois B. Botha[2]

[1]Southern Illinois University at Carbondale, Department of Physics, Carbondale, Illinois 62901-4401; [2]Illinois Clean Coal Institute, Carterville, Illinois 62918.

KEYWORDS: FGD gypsum, sulfite-rich materials, value-added products, mercury

ABSTRACT

Massive quantities of flue gas desulfurization (FGD) scrubber materials, both sulfate-rich and sulfite-rich, are produced in the nation. Though the bulk of FGD gypsum produced is utilized by the wallboard and cement industries, it still leaves more than 3 million tons to be managed. The management of sulfite-rich scrubber material is much bleaker as most of the 16 millions tons produced every year ends up in landfills. In the last few years, our research has focused on developing additional uses of FGD gypsum and sulfite-rich materials, e.g., countertops, decorative tiles, and paperless wallboard materials. As these products are upscaled, we have continued to explore strategies, which will result in additional value-added materials from FGD scrubber byproducts. In this presentation, we report the following: (1) The co-processing and co-blending of the sulfate-rich and sulfite-rich scrubber materials could result in the significant use of sulfite-rich material. (2) We attempted to develop molding dies from fixated sulfite-rich scrubber material and polymers. The flexural strength ranged, depending upon the concentration of the polymer, from 10 MPa to 30 MPa for the green composites. As expected, the concentration of the polymer strongly influenced the strength. However, 4 to 5 wt% polymer gave enough strength for the product to be used for molds. (3) We also developed green structures for molding materials, using sulfite-rich scrubber material and cheap natural byproducts. By controlling the variables, such as water and natural polymer concentrations, we were able to attain a strength exceeding 10 MPa. Thus, our product was much stronger than plaster-based molds. This was accomplished with only 3.5-wt% natural polymer. (4) The fate of the mercury during the processing of these products was monitored.

Submitted for consideration in the 2005 World of Coal Ash, April 11-15, 2005, Lexington, Kentucky, USA.