

Development of Activated Carbons from Unburned Carbon for Mercury Capture

M. Mercedes Maroto-Valer*, Yinzhi Zhang and Zhe Lu

Department of Energy and Geo-Environmental Engineering and The Energy Institute,
The Pennsylvania State University, 405 Academic Activities Bldg, University Park, PA
16802

*Presenting author: Ph: 814-863-8265, Fax: 814-865 3248, e-mail: mmm23@psu.edu

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ABSTRACT

Following the current demand to develop technologies to utilize high carbon content fly ash from coal-fired combustors or gasifiers, a one-step activation protocol has been developed by the authors to produce activated carbons from unburned carbon in fly ash. Compared to the conventional two-step process that includes a devolatilization of the raw materials, followed by an activation step, unburned carbon only requires a one-step activation process, since it has already gone through a devolatilization process while in the combustor or gasifier. The produced activated carbons with a fine particle size are not only rich in micropores, but they also present a high content of mesopores, which leads to excellent mass transfer properties during the adsorption process together with a high surface area. The injection of carbon adsorbent is a promising technology to control mercury emissions from coal-fired combustion systems. Accordingly, in this study the activated carbons produced from unburned carbon in fly ash are tested for mercury capture using a simulated flue gas and the results are compared to those reported for commercial activated carbons.