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Synchrotron imaging of metallurgical coke for analysis of coke quality

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Metallurgical coal is a major Australian commodity export, worth more than A\$20b *per annum*. It is used to make coke, a vital component in steelmaking. High quality coke is important for successful operation of modern ironmaking blast furnaces. Crucial to coke quality is the strength and reactivity of this porous composite material. There is a close relationship between coke quality and its microstructure, which varies at micron scale. As part of a comprehensive study of the factors that affect coke quality, from the properties of the original coal, through the processing into coke and then its utility in the blast furnace, we have used the Imaging and Medical Beam Line at the Australian Synchrotron to study the relationship between coke quality and its microstructure. In three separate projects, we have (a) imaged coke to determine its cold strength (b) imaged laboratory prepared samples to examine the transformation into coke and (c) imaged progressively reacted coke at high temperatures to examine its behaviour in the blast furnace. In this presentation we will present brief results from each of these studies, to illustrate the benefit of synchrotron science to the coking coal industry in Australia.

Keywords

metallurgical coke; microstructure; strength; reactivity; coal-to-coke transformation

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