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Application of a novel biowaste-derived biocoal as coal substitute in Electric Arc Furnace

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The utilization of biochar as valid alternative to fossil coal for steel bath carburization and slag foaming has already been proved with small scale and industrial tests.
The material availability and the related cost remain important issues to allow the utilization of biochar in current industrial practice. Reusing biogenic wastes is a promising solution, but the concentration of inorganics (P, K, Na, etc) can be harmful for the use in the steelmaking sector. In this project, four different biocoals have been produced starting from straw, sludge from water treatment plant, digestate from animal dejection, and organic fraction from municipal waste. The biogenic materials have been pyrolyzed and then processed by chemical leaching following a RE-CORD patented process. Leaching contributes to increase the quality of the biocoal, as it reduces the ash content of the char, increasing the C content of > 30%, the calorific value of up to 50%, and make the biocoal less reactive at high temperatures. In parallel the leachate is rich in elements (as phosphorus, potassium, calcium) which can be further recovered and valorized in agriculture. The thermal behavior of the material has been characterized by thermogravimetric analysis. The pellets obtained from pyrolyzed and leached materials have been used in melting tests in a laboratory furnace, to study the interaction of biochar in contact with molten bath.
The characterization activities and the performed tests gave positive results respect potential industrial utilization of these materials.
These activities have been carried out in the frame of Research Fund for Coal and Steel within the project BIObased REsidues Conversion to Advanced fuels for sustainable STeel production –BIORECAST.

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