**Solid pyrolytic lignin as a substitute for fossil-derived carbon binders in the manufacture of bio-carbon electrodes for metallurgy and steelmaking**

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**Abstract: Short description of the presentation topic about 250 to 600 words.**

Carbon is a critical material for metallurgy and steelmaking. The unique chemical and thermo-physical properties of carbon make it irreplaceable in the manufacture of furnace electrodes. However, the carbon used for these applications originates from fossil sources. Therefore, novel bio-carbon substitutes are being explored, as they can substantially reduce the carbon footprint of these products.

Pyrolytic lignin (PL) is obtained by thermochemical fractionation of fast pyrolysis bio-oil and consists of a complex mixture of organic compounds from the lignin fraction of lignocellulosic biomass. PL is usually found in the form of a viscous liquid, but when is heat-treated and lower molecular-weight volatile compounds are removed, solid pyrolytic lignin (SPL) can show a pitch-like behaviour with a tuneable softening point, making it interesting for its use as a substitute of current fossil-derived carbon binders, e.g., coal tar pitch (CTP). However, when carbonized, SPL behaves as a hard carbon and shows low graphitization degree, unlike CTP, which is a soft carbon with excellent graphitizability. In order to promote graphitization of hard carbons, catalysts of different nature have been investigated. However, one of the greatest challenges of catalytic graphitization on bio-carbon electrodes is catalyst removal, as graphitization catalysts are not easily separable from the carbon matrix and promote reactions that accelerate electrode consumption.

In the present work, several properties of both as-received and carbonized SPL will be discussed, including physicochemical, rheological, electrical and graphitizing properties, as well as their reactivity to air and CO2, and their wettability on different fossil-derived carbon aggregates, which are of interest for their performance in their future use as binder for bio-carbon furnace electrodes.

**Biography of Presenter about 100 words:**

Luis M. López-Renau is a postdoctoral researcher at the Unit of Processes of the Material Science and Engineering Department at Kungliga Tekniska Högskolan (Stockholm, Sweden). He received his PhD degree in Industrial Technologies from Universidad Rey Juan Carlos (Madrid, Spain) and the title of his PhD thesis is "Ex-situ catalytic fast pyrolysis of wheat straw over acid-base catalysts for the production of high value-added bio-based chemicals". His experience in thermochemical conversion technologies led to his current work on the development of biomass-derived carbon materials for the manufacture of carbon electrodes, carbon lining pastes and carbon-containing oxide refractories used in metallurgy and steelmaking.

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* **Please to attach a recent high-resolution photograph of the presenting author.**

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