



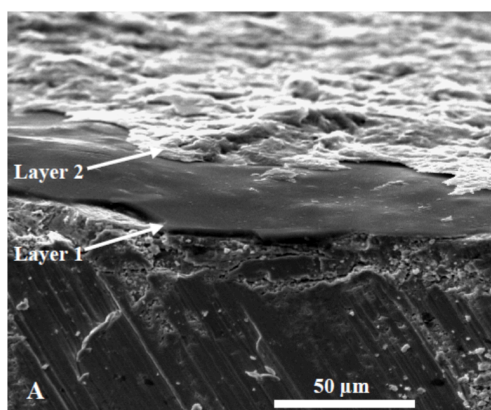
FiberLaboratory

RESEARCH TO BUSINESS

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Durable Carbon Coating for Industrial Use

In a slow pyrolysis process at a temperature of about 300 °C, wood and biomass produce gas that can be used to coat metals. The gas is led to a separate coating chamber, where a thin carbon coating quickly grows on the surface of the metal from carbon-containing components and adheres firmly to its substrate (Layer 1-2 in the figure).



Raw material: Fresh, dry or even decayed wood, but the best gas composition is obtained from hardwood. To produce homogeneous gas, the piece size distribution of the wood feed must be narrow (e.g., 4–5 mm), or the structure of the pyrolysis process must be modified so that the pieces of all sizes are charred in the same carbonisation step.

Gas Pre-treatment: Before supplying gas to the coating chamber, solids particles should be removed from the gas to prevent them from entering the coating.

Coating: The gas flowing through the coating chamber contains carbon monoxide, carbon dioxide, and light hydrocarbons and is approximately oxygen-free. Both the gas and the objects or equipment to be coated must be at the same temperature.

State of the art

There are numerous industrial sites where rapid corrosion and wear of the process equipment are significant problems. Suitable coating targets include reinforcement of precast concrete elements, beams, and fasteners, as well as industrial chemical tanks, heat exchangers, and machine coolers. With a diamond-like carbon coating created from the gas phase, even the above-mentioned complex devices and components can be comprehensively and evenly protected with a non-toxic coating. This extends their service life and allows them to be manufactured from cheaper materials.

Technology

Xamk has developed and tested a coating method based on chemical vapour deposition technique, in which a diamond-like carbon coating with a fullerene structure forms on the surface of the metal. The method can be implemented as part of the biochar production process and biochar activation. The biochar production process is a new type of continuous two-stage carbonisation process.

Advantages

The coating material has been found to be environmentally friendly and chemically very stable. The intact coating has been shown to provide excellent corrosion protection and resistance to chemicals, bends, and temperature fluctuations (below 400 °C). Additionally, the coating reduces slip friction and is suitable for coating complex objects and fasteners susceptible to corrosion.

Options for companies

Xamk is looking for partners for joint research and development, prototyping and testing the metal coating. Direct contract research is also possible.

Your contact persons for this offer

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