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**Efficient carbonization of PAN fibres with scalable linear microwave plasma source**

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Energy saving by lightweight constructions, especially for mobility applications, is a future key topic. The demand on cost-effective lightweight materials such as carbon fibres is continuously growing. Beside the substitution of energy-intensive and long production processes, the development of innovative manufacturing processes is required.

Microwave plasmas are efficient heat sources and a source of activated species. These species enable verifiable accelerated chemical processes during the stabilization or carbonization of PAN fibres. They are also able to modify or activate the surface of the fibres, a capability which will considerably enhance, for example, the adhesion in matrices.

Thus a microwave plasma source, which is linearly scalable and operates in a wide pressure range, has been developed. The electric field distribution is dedicated for the treatment of electric-conductive fibres. A cross-linking of the microwave generators allows an efficient and controllable plasma generation. A gradual treatment of the fibres is possible.

Based on this plasma source a lab scale test bench to condition fibre rovings has been designed. Stabilization, carbonization and functionalization of PAN fibres in sufficient quantity become thus possible to enable further fabrications, e.g., CFRP components.

**Keywords**

microwave plasma

fiber

surface functionalization

CFRP

carbonization