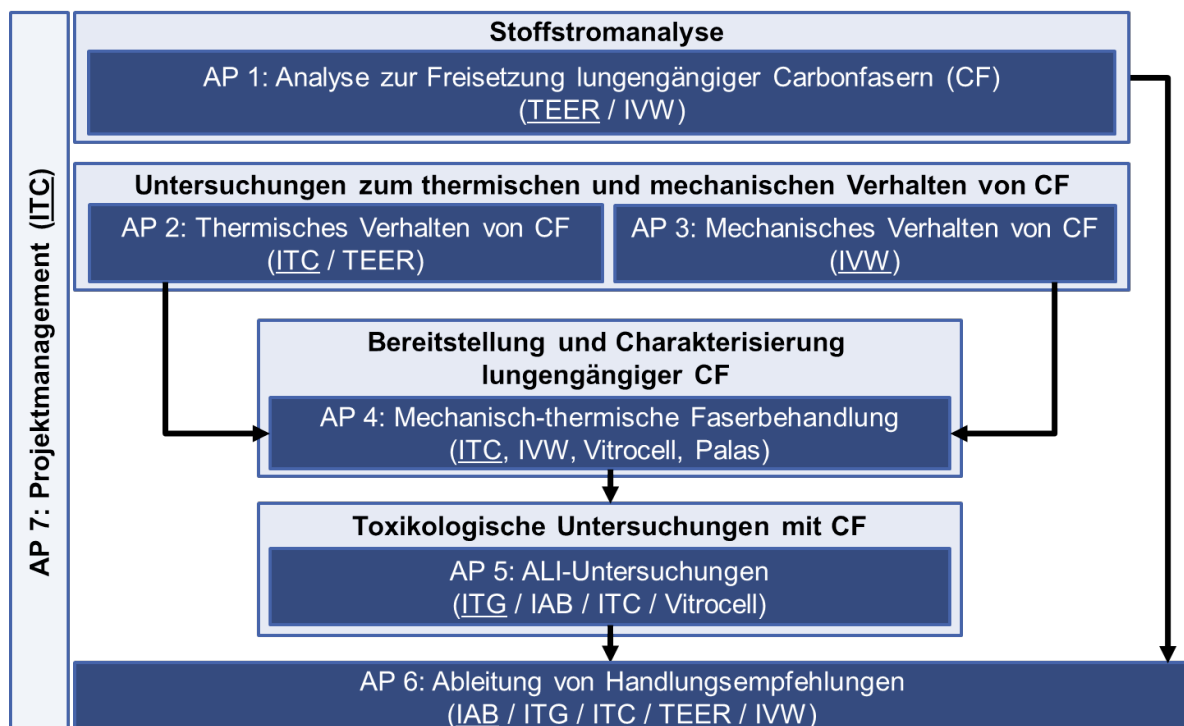


Carbon fibers in the circuit (CFC) - release behavior and toxicity during thermal and mechanical treatment

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Project partners: **KIT-ITC**, KIT-IAB, KIT-IBCS-BIP, RWTH Aachen, IVW Kaiserslautern, Fa. VITROCELL, Fa. PALAS



CFC work plan with involved partners

The increasing spread of CFRP products and the associated increase in production and processing steps, as well as recycling and disposal processes, can lead to the formation and release of respirable biodegradable dusts. This raises the question of the extent to which the fine dusts emitted in this process have an impact on humans and the environment.

The aim of the CFC project was to identify realistic release scenarios throughout the life cycle and to assess the toxicology of the respirable dusts and fibers released. From this, recommendations for the safe handling during production, processing, recycling and disposal of these materials are to be derived.

The CFC project was divided into six scientific work packages (WP). In WP1, a material flow analysis was carried out to identify relevant release scenarios of respirable dusts during mechanical and thermal stressing of CF/rCF/CFRP materials. Based on this, investigations were carried out under thermal (WP2) and mechanical stress (WP3). In AP4, respirable test dusts from mechanical and thermal exposure, respectively, were provided and characterized to be airborne to the gas-liquid interface of human lung cells (ALI) in an exposure system. In AP5, epithelial, macrophage, and fibroblast cell cultures in monoculture and coculture were used for toxicological evaluation and

investigation of respirable CF fragments (cytotoxicity, oxidative stress, DNA damage, inflammatory effects, activation of signaling pathways). The toxicological studies were performed using the ALI system, i.e. directly on the apical surface of the cells. The aim of AP6 was the hazard assessment and risk evaluation based on the exposure limit values DNEL (derived no-effect level) and PNEC (predicted no-effect concentration) to be determined. As a result, recommendations for action were drawn up.

The inclusion of relevant stakeholders from research, industry, associations and federal agencies in an accompanying group ensures that the investigations are aligned with relevant boundary conditions.

Publications of the project results are available at:

<https://publikationen.bibliothek.kit.edu/1000155321>

<https://publikationen.bibliothek.kit.edu/1000141761>



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