sccer mobility

In cooperation with the CTI

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Minimization of vehicular energy demand: Capacity area A3 activities

Aim: Develop technologies for minimization of the energy demand excluding the powertrain itself. This includes new routes to high volume lightweight thermoplastics and bioinspired composites. The functional integration of thermal insulation into composites and thermal management of vehicles as a whole will allow further reducing the non-propulsive energy demand.
The partners of this capacity area are grouped along this lead topic to interact on common tasks which will result in a complementary set up of research activities.

With the effort on *New routes to recyclable, bioinspired and high volume lightweight components* Swiss research in thermoplastic composites will be better coordinated, leading to a combined technical composite processing development and LCC/LCA analysis. The investigation of *thermal management including thermal insulation* will contribute to the minimization of non-propulsive energy for passenger comfort in rail and road applications offering a considerable element of novelty in this SCCER and synergies with the field of composite materials and multi-functional sandwich structures.

This capacity area will address novel approaches of mass reduction leading to smaller power demands for acceleration. New routes to high volume production of lightweight thermoplastic composites such as the use of pre-polymers with subsequent novel and robust in situ polymerization, or the use of novel low viscosity polymers blends or novel hybridization and comingling techniques will contribute to the increased use of these materials. Furthermore, thanks to their recyclability, they represent an attractive alternative in the light of the European directive for the end-of-life of vehicles, while the investigation of novel bioinspired materials will lead to micro structured composites with enhanced fracture toughness or allow for mimicking nature by establishing materials with self-healing properties and thus extended durability. At a higher size scale, the investigation of smart thermal management technologies will contribute to vehicular energy demand by enabling the use of unsteady heat sources for HVAC through thermal energy storage or by actively conditioning the vehicle while non-operational.

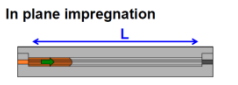
Life cycle of thermoplastic composites in vehicles

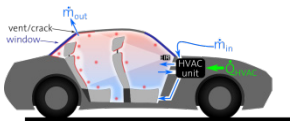
Raw Materials:
Reinforcement: Fibres or particles
Matrix: Thermoplastic polymer

Processing:
Novel impregnation methods for fibres
Alignment of particles

Vehicle in use:
Weight saving effect
Thermal management in electrical vehicles

End of life:
Recycling of thermoplastic composite parts





Corresponding posters

Bicomponent Fibers for Thermoplastic Composites: Towards a new intermediate material for rapid stamp forming

Bioinspired composites by vacuum assisted magnetic alignment

Composites reinforced via mechanical interlocking with surface roughened microplatelets

Processing of flax fibre thermoplastic composites

Novel impregnation routes for thermoplastic composites: Transverse impregnation of dry fabrics with thermoplastic melts

Development of a heating and cooling energy demand model for the Swiss passenger car fleet

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