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LED-UV-Curing Systems for Textiles and Composites

14th Cornet Call
Project Start Date: 01.05.2013
Project Duration: 24 months
Goal
The aim of the LEDcure-project is the development of technological solutions for the application of UV-LED curing systems in textile coating and finishing for technical textiles (protective, outdoor, and object textiles) and textile/fibre reinforced polymer matrix prepregs (preimpregnated dried/partially cured fabrics or rovings). The focus lies on the use of UV-LED emitter lamps (LED = light emitting diode) as a future, energy efficient, and eco-friendly technology.

Background
In times of increasing energy costs and a growing environmental awareness the textile finishing and composite production tends to modern, ecological, energy and cost efficient methods. UV curing is a well-known and established technology in many industrial sectors such as the graphic, wood, or varnish sector. In the sectors of textile coating/finishing and composite prepreg production this technology is so far little utilised, but is gaining interest due to being a more energy efficient and eco-friendly alternative compared to the currently used thermal curing processes.

Major advantages of the UV-LED-technology
- Low energy consumption
- Low space requirements and a flexible geometry of the UV-LED aggregates
- Narrowband and intensive emissions-spectrum at UV-A range (315 – 400 nm) ⇒ No formation of toxic ozone
- Nearby no emission of heat radiation ⇒ Very sensitive to the used materials
- High operation lifetime (~ 50000 h)
- Radiation source is free of toxic mercury

Objective of the project
In this project the UV-LED curing technology will be applied to textile coating and finishing as well as composite prepregging. The focus hereby will be on the chemistry and rheology of the coating, finishing, and resin formulations. Various 100 % and water based systems will be studied. For preparing the functionalised technical textiles and prepregs typical textile coating and finishing technologies like bar or knife coating, padding, kiss roll or spraying will be implemented, both on lab- and semi-industrial scale.