

PRESS RELEASE

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Morten Voß receives award for best presentation at the International Conference on Structural Adhesive Bonding 2021

Morten Voß from the department 'Adhesive Bonding Technology' at Fraunhofer IFAM convinced the jury of the "6th International Conference on Structural Adhesive Bonding 2021" with his presentation "Validation and numerical studies of Curie-supported accelerated curing by means of inductive heating". Among 129 oral presentations, his contribution was awarded for the best scientific content and an excellent presentation quality. In front of an audience of around 300 participants from 27 nations, this year's conference was held in hybrid form on 8th and 9th July 2021 in Porto, Portugal.

The topic of his presentation was the accelerated curing of adhesives using special magnetic susceptors, so-called Curie particles. These can be introduced into adhesives as a typical filler material and heated by an external electromagnetic field. The generated thermal energy leads to a faster chemical cross-linking reaction of the adhesive, which consequently takes a few minutes and not – as usual – several days. The application of Curie particles allows the use of the material-specific Curie temperature, T_c , as a limit for the introduced heat. In this connection, Curie particles lose their magnetic properties when T_c is reached and cannot be heated further above this temperature. In this way, overheating of the adhesive can effectively be avoided without the need for costly, external measurement techniques such as thermocouples or IR cameras. As a result, a self-regulating curing process is created, which - unusual for adhesives - runs independently from ambient temperatures and opens up great potentials for a wide range of applications.

Simulation models provide insights into the fundamental relationships of Curie-particle-curing

Experimental investigations from Fraunhofer IFAM on a wide variety of component geometries have shown that the heating behaviour of Curie-particle-cured adhesive layers represents a highly complex interplay of various superimposing effects. Due to this fact, practitioners currently have to

Editor:

Dipl.-Biol. Martina Ohle | Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM | Phone +49 421 2246-256
Wiener Straße 12 | 28359 Bremen | www.ifam.fraunhofer.de | martina.ohle@ifam.fraunhofer.de

conduct elaborate and costly preliminary experiments in order to identify optimal process parameters for their particular application. In order to be able to apply the manufacturing process more efficiently and target-oriented in the future, the scientists at Fraunhofer IFAM developed a simulation model based on the Finite Element Method (FEM), which captures both thermal as well as reaction kinetic aspects of Curie-particle-curing, providing new insights into the fundamental relationships of the process. Amongst others, the developed FE model opens up the possibility to predict induction times needed for full cure of the adhesive layer as a function of various boundary conditions such as adhesive layer thickness or component temperature. In this way, decisive steps towards more process controllability for practical application of the technique could be taken.

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About the conference

The "International Conference on Structural Adhesive Bonding" is held every two years in Porto, Portugal. The thematic focus lies on structural bonding, but also on other relevant areas of adhesive bonding technology. These include fundamental aspects of adhesion theory, science and technology of surfaces, advances in adhesive development, mechanical properties of bonded joints, innovative designs and applications, testing and standardisation, industrial aspects, quality procedures, as well as environmental and ecological aspects.

Further information

www.ifam.fraunhofer.de/en/Core_Compencies/Adhesive_Bonding

Pictures

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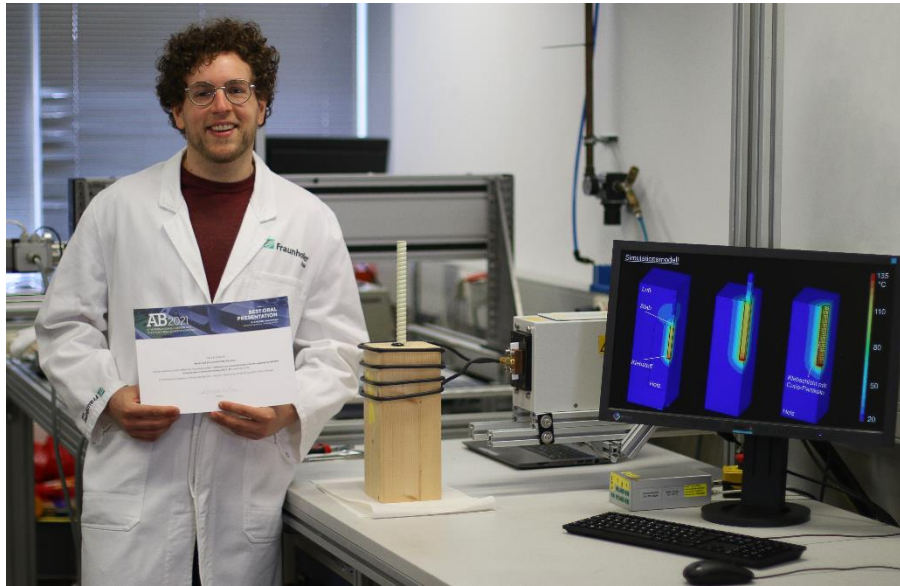
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Contact:

Morten Voß M.Sc. | Phone +49 421 2246-7430 | morten.voss@ifam.fraunhofer.de | Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM | Wiener Straße 12 | 28359 Bremen | www.ifam.fraunhofer.de

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Morten Voß receives award at the Structural Adhesive Bonding 2021 conference for presenting his research results on "Validation and numerical investigations of Curie-supported accelerated curing using inductive heating". © Fraunhofer IFAM