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FAPS

Marie Skłodowska Curie Action – Postdoctoral Fellowship 2023
Expression of interest – Hosting offer
(MSCA-PF-2023)

<table>
<tr><td rowspan="2">Contact Person/Scientist in charge (data of the principal investigator of the research group/lab or scientific supervisor)
Name
Surname</td><td>Thielen</td></tr>
<tr><td>Nils</td></tr>
<tr><td>Email</td><td>nils.thielen@faps.fau.de</td></tr>
<tr><td>Laboratory /Department /Institute /Centre / Name
(data of the centre/department where the fellow would be located</td><td>Friedrich-Alexander-University Erlangen-Nürnberg,
Institute for Factory Automation and Production Systems,
Research Sector Electronics Production</td></tr>
<tr><td>Address</td><td>Fürther Straße 246b, 90429 Nürnberg, Germany</td></tr>
<tr><td>Research Area
(Please select the research area: corresponding to the eight MSCA evaluation panels. You can select between one and up to three scientific areas per EOI)</td><td>Information Science and Engineering (ENG)</td></tr>
<tr><td>Brief description of the Centre/Research Group
(max. 1,600 characters including spaces: information about the research centre or research group, scientific staff. Please include URL if possible)</td><td>The Insititute for Factory Automation and Production Systems is a recognized institute for teaching and research in the area of automation and mechatronic systems, with a interdisciplinary development of holistic optimization to serve the welfare of the people. In its eight research sections, the approximately 100 scientists conduct research on topics related to electronics production, electrical engineering, signal and power networking, home automation, automation technology, engineering systems, medical technology and robotics.
In the research sector of electronics production, to which this project belongs, the conventional production of electronic modules as well as power electronics and printed electronics are addressed. On the one hand, there is a particular focus on the digitization and further automation of process chains through the use of artificial intelligence. On the other hand, innovative process technologies are being developed at the institute that enable flexible and energy-efficient production of complex assemblies. These research projects are mostly realized in close cooperation with industry and thus ensure a high level of application relevance and benefit. Furthermore, the research can rely on the comprehensive laboratory, which offers state-of-the-art analysis equipment (e.g. scanning electron microscopy) in addition to the production machines (e.g. a complete SMT production line).

(https://www.faps.fau.eu)</td></tr>
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Project description *(max. 1,800 characters including spaces: short description of the research project / research line where the fellow would be hosted and develop his /her project)*	Ultra durable, highly conductive die attach materials with high thermal conductivity have reached the power electronics market of which silver sintering using micro- or nano particle pastes is the most common. The process chain includes paste printing, hot pre-drying, die-placement and the sintering step at temperatures comparable to SnAgCu soldering temperatures. The used bare die chips usually possess a noble metal bottom metallization, which is compatible with silver with respect to intermetallic phase creation. Most often, in contrary to soldering, pressure is applied to the chip to speed up the sintering process and increase the bulk density of the sintered joint. However, due to comparably long drying times it is several minutes slower in production than the formerly used soldering. In this project, a different method - **Pressure Assisted Direct Bonding of Silver for Die Attach to Ceramic Substrates** - shall be examined thoroughly which renders the use of silver paste as die-attach material and the required drying times redundant. Meaning less machine equipment is required on the manufacturer side. Copper ceramic substrates with silver metallization are brought in direct contact with the noble chip bottom metallization and have successfully been manufactured as first proof of concept samples. When applying pressure and heat, through interface diffusion processes a solid interconnection joint develops. Thus, forming a pure silver die-attach interconnection of only 1 µm - 5 µm. The substrate's silver metallization is applied either via electro-plating or via electroless plating. Based on these preliminary tests, concepts and simulations have to be developed that address the necessary investigations of the substrate and the compound itself to realize a qualification of the technology.
Applications: documents to be submitted and deadlines *(Please indicate the documents that the candidate fellow should submit to establish contact: CV, letter of motivation, letter of references, etc., please indicate deadline. Recommended deadline: April 2023)*	- CV - Letter of Motivation - Certificates and References - Abstract of PhD Thesis - Deadline: 30.06.2023