CORNET Call for Proposals: International Collective Research

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Subject:	Meltflowanalysis and Characterization in Plastic Packaging Processing
Coordinator: **Other applicant(s):**	Fraunhofer Institute for Process Engineering and Packaging IVV https://www.dresden.fraunhofer.de/de/institutes/fraunhofer_ivv-dd.html
Sector:	X Materials X Process Engineering, Energy Technology and Environment □ Business Management and Organisation X Construction and Production □ Chemistry, Textile, Food, Health and Medical □ Measurement and Information
Target group:	Packaging, Processing and Plastic industries, automotive, electronics
Proposal summary:	The transition to sustainable packaging, including polyolefin monomaterials (PE, PP), biopolymer- based layers, and the increasing use of recycled polymers, improves recyclability but presents challenges due to poorly understood melt flow behavior during sealing. Key issues include narrow temperature windows, risk of carrier damage, and unpredictable biopolymer or recycled material properties, requiring tailored processes. Key Challenges 1. Material variablitiy: Inconsistent melting and flow behavior in biopolymers, recycled materials, and polyolefin-based composites. 2. Process dynamics: Precise control of temperature, tool distance, and melt flow is critical, especially at seams or layer transitions. 3. Lack of predictive tools: Existing tools fail to accurately describe melt flow dynamics for novel materials. The project aims to optimize melt flow in polyolefin composites, biopolymers, and recycled materials through experimental and numerical methods, enabling reliable, efficient processing for sustainable materials.

	Methodology 1. **Experimental measurements:** Real-time monitoring with advanced visualization will assess temperature profiles, tool effects, and melt flow dynamics in laboratory experiments. 2. **Numerical simulation:** iSPG prototypes in LS-DYNA will model heat distribution, tool displacement and melt flow dynamics 3. **Process optimization:** Data integration will guide the development of tailored strategies for efficient sealing across various materials, including recycled content.
Advantages for trade and industry:	Packaging Technology and Broader Applications This project focuses on flexible packaging technology, driven by the demand for sustainable materials, addressing challenges such as: • Optimizing sealing process for polyolefin-based monomaterial composites (PE and PP). • Developing process parameters for biopolymer sealing layers • Ensuring the seal reliability in critical areas, such as layer transitions or folds. Broader Applicability Beyond packaging, the developed methods also apply to: • Pipe Welding for infrastructure applications. • Automotive plastic welding, such as for fuel tanks of bumpers. • Medical technology, e.g., sealing of fluid containers or syringes. • Electronics, e.g., precision welding of plastic casings.
Dissemination concepts:	The results of this project will be highly relevant for the entire plastic industry, where welding and sealing processes are critical.
Profile of additional partners:	We are looking for any research/ industry partner to contribute to this project idea.
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