INSTITUTE FOR PLASTICS PROCESSING

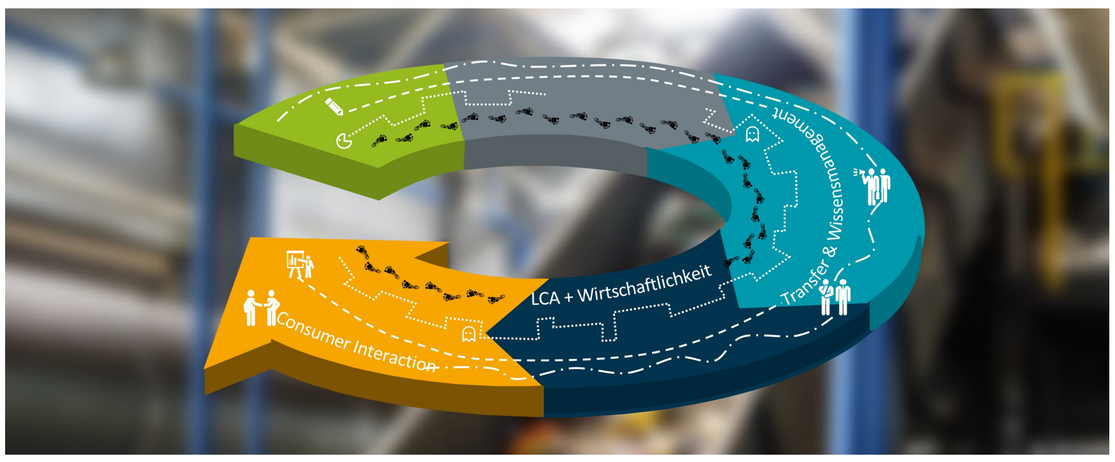
in Industry and Craft at RWTH Aachen University

Key research area: Circular Economy

Research on Circular Economy at IKV

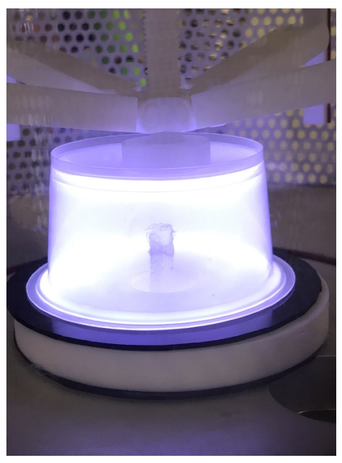
The urgent need to bring plastics and plastic products into a cycle requires a wide range of activities from industry as well as research and development. Since the 1980s, IKV has been working on solving numerous issues of recycling, recyclate processing, characterisation and utilisation as well as recycling-compatible product design. Current activities in the area of Circular Economy also include research and development to realise multiple use of plastic products (e.g. bottles for beverages or chemicals) as well as the use of recyclates for high-quality products. For this purpose, it is necessary on the one hand to develop processes that are tolerant to the processing of impure plastics with different melting properties. Current projects are therefore concerned, for example, with the use of recyclates in film extrusion and injection moulding. On the other hand, these processed products still have properties that do not allow their use as packaging for certain products. This is where plasma technology at IKV plays an important role in recycling-oriented product design. In combination with digital innovations, the results can contribute significantly to increasing recycling rates as well as the circularity of plastics. This includes a digital infrastructure for mapping the entire life cycle and innovative data science methods.

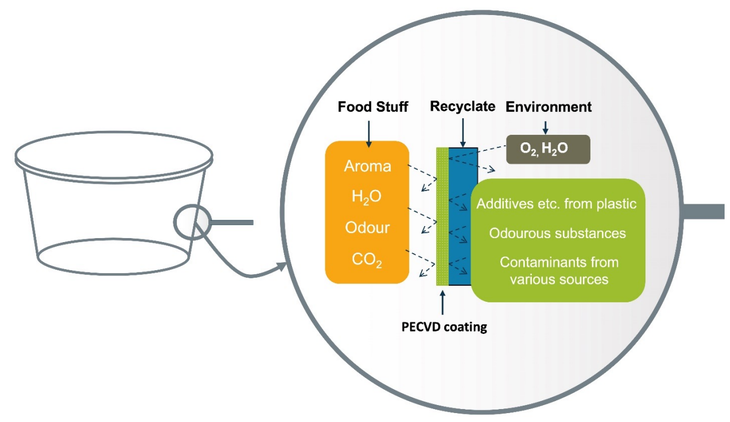
Digitalisation: „PlasticBond“ & „KI-Optipack“



- Insufficient recycling rates of plastics products
- Implementation and application of digital technologies and artificial intelligence for improved circulation and recycling of plastics products
- Cooperation with important players of plastics chain values with support of the BMBF

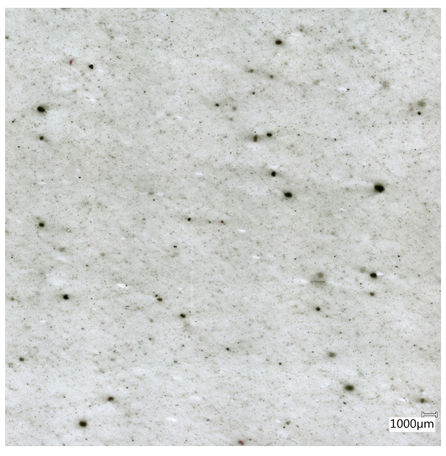
Coatings for migration and permeation barrier





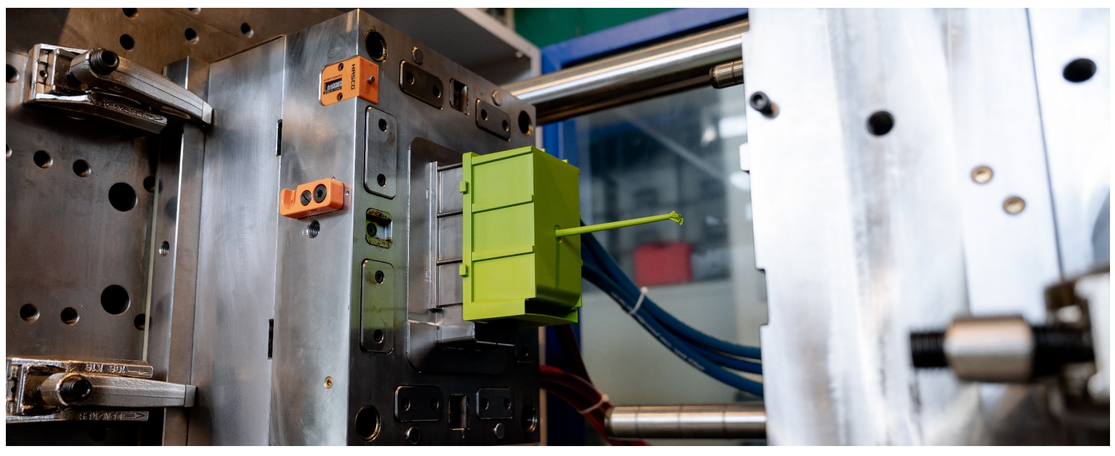
- Volatile impurities in PCR lead to unacceptable odor and smell.
- Conventional multilayers for barrier generation are not recyclable
- Extremely thin coatings produced by Plasma-Enhanced Chemical Vapour Deposition provide high barrier and resistivity without compromising good recyclabity.

Processing and characterisation of recyclates



- Recyclates include impurities and have batch and producer depended fluctuating properties; bad influence on stability of the processes
- Capturing the range of fluctuation in the market
- Development of strategies to stabilise processes and products at an economically and technically high level

INJECTIX: Process control for recyclates



- Frequent fluctuations in viscosity of PCR require readjustment of injection moulding settings, making the process uneconomical
- Changes in viscosity are identified via process parameters
- Automated process controll concept „INJECTIX“ controls the entire injection and holding pressure phase of the machine

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