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Unique value chain collaboration project “Design4Circularity” achieves first circular cosmetics packaging concept

- Giving packaging waste a second life in Personal Care applications - Designed to be recycled again and again: uncolored bottle with 100% Post-Consumer recyclate content (PCR), equipped with a printed deinkable full-body shrink sleeve - Full sortability in current recycling infrastructures possible - Innovation unveiled ahead of K 2022: step-wise introduction of individual solutions like additives, PCR, and suitable inks, available directly to the market



Moving circular plastic packaging forward. In a first and unique collaboration for the Personal Care industry, Clariant, Siegwerk, Borealis, and Beiersdorf are combining expertise to tackle the challenge of creating recyclable consumer packaging, based on 100% retrieved plastic packaging waste, for cosmetics applications. The pioneering initiative, named "Design4Circularity" is providing innovations and insights for the different design aspects to encourage others to also follow design for circularity principles.

The cross-industry collaboration is targeting the achievement of truly circular packaging by incorporating full life cycle thinking in each development step, to create a new standard for the industry. Circular packaging supports reduced plastic waste, less use of new/virgin plastic material, and reduced climate impact, which are critical challenges facing our planet.

Richard Haldimann, Chief Technology and Sustainability Officer, Clariant, says: “This collaboration was possible because all participants are dedicated to circular economy, with company-wide programs and holistic understanding of the systems involved. Achieving circularity needs a complete shift in designing product packaging and packaging raw materials, considering recycling and packaging end-of-life.”

Stefan Haep, Technology Head Brand Owner Collaboration at Siegwerk, adds: “Our initiative is a frontrunner in uniquely assessing circularity in every design parameter, from additives to bottle material to inks, mapping industry competencies, potential gaps, and feasibility proof points to open up viable, ultimately circular solutions.”

The mission was to design a packaging solution that creates a cleaner input waste stream and finds its way back into the loop in high-value applications. It should also allow for the high-quality visuals and distinctive shapes consumers associate with cosmetics packaging and brands.

To deliver on all these factors, the innovation centres on a colorless polyolefin bottle with 100% PCR content, full body sleeved in a printed deinkable shrink sleeve. All materials are technically fully recyclable with the potential to be recovered and used for the same high-value application.

Stefan Rüster, Packaging expert from Beiersdorf, continues: “We follow an ambitious Sustainability Agenda including the vision of fully circular resources. The Design4Circularity packaging solution is ground-breaking for future cosmetics applications. Through the hard work and innovation power of all

collaboration partners involved, we have managed to combine the high design requirements of a cosmetic packaging with full circularity. We are very proud of this success and hope that this motivates our industry peers to follow."

And Peter Voortmans, Global Commercial Director Consumer Product, Borealis, concludes: "Transforming to a circular economy is a team effort. Only together with like-minded partners can we shape an 'evermindful' tomorrow. It starts with packaging design in combination with the right sorting and recycling infrastructure, and through collaboration we re-invent essentials for sustainable living."

Designed to be recycled again and again

Critical design parameters included polymer and additive composition, material selection of sleeve and bottle, sortability and deinking of sleeve material, recyclability and PCR quality.

To give packaging waste a second life the packaging material needs to retain its highest value through multiple lifecycles. Here, Borealis brought its expertise in advanced, transformational mechanical recycling by offering high quality PCR based on proprietary Borcycle™ M technology. Additionally, Clariant brought expertise in design for recycling additive solutions to ensure targeted additivation to protect PCR quality and protect polymer chain breakdown at each recycling step. This delivered a suitable, high-value PCR material to repeatedly hit the demanding criteria of Personal Care-related consumer packaging. The circular solution additionally focuses on a colorless bottle option to increase PCR quality after recycling.

To achieve differentiation of the packaging despite using an uncolored bottle, the collaboration decided on a full body shrink sleeve as the ideal way to allow for the unique design of individual brands. Leading ink manufacturer Siegwerk was able to provide ink systems, which in collaboration with Beiersdorf and a sleeve manufacturer allowed printing of the sleeve to realize a full body, colored and

appealing cosmetic sleeve. Additionally, the chosen new ink composition was designed to allow deinking of the sleeve within a recycling process, increasing the circularity of the packaging. The bottle / shrink sleeve combination is intended for removal at a materials recovery facility.

First sorting trials in existing recycling infrastructure proved the sortability of the full body sleeved HDPE bottle, achieving a high recovery of the bottle's material. Additionally, the project team conducted trials with full body sleeved, transparent PET bottles and achieved similar results.

Further advancements in sorting technology are needed to achieve the ultimate goal of circular economy to give colorless bottles a second life back in colorless applications retaining their highest value. Technologies such as digital watermarking or artificial intelligence could help such sustainability goals to be reached.

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