A Study on Eco-friendly Removal Method of Plastic Cup Printing Ink

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This study began after contemplating the low recycling rate, which is the biggest problem of plastic, and focused on plastic cups that cannot be recycled due to the ink printed on the outside. Lemon and orange extract, roasted corn water, baking soda, and sodium percarbonate were selected as eco-friendly ink removal substances and a 3% mixture of orange extract and sodium percarbonate is the most effective. As the number of physical stimuli through ultrasound increases, the ink removal rate increases. To automate the removal of plastic cup printed ink and to verify the possibility, a simplified device was built using Arduino coding. It erases ink when the cleaning process is operated, and when the pH and turbidity of the specimen reach the set range, the waste specimen is automatically removed, and the new sample is filled in the bin. As a result of cleaning, the printing ink was effectively removed. To verify the effectiveness of removing ink from eco-friendly materials, I used GC-Mass, FE-SEM, and EDS to analyze. As a result of GC-Mass analysis, the number of ingredients detected decreases as the number of ultrasonic stimuli increases. In other words, it was confirmed that the ink removal rate increased. Through FE-SEM, it was confirmed that ink was removed from the surface after treatment with eco-friendly materials, and as a result of EDS analysis, it was confirmed that components such as Mg, Al, Si, and Ti can be removed by eco-friendly materials. In particular, it is effective in removing Ti.

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