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Applications of dielectric-based sensors in the alcohol refining process and automation integration

An automated system integrates a dielectric-based sensor, leveraging commercial automotive flex fuel technology, to rapidly and accurately determine the optimal time for adsorption column replacement during biobased alcohol purification.

Climate change is becoming a major problem worldwide, thus prompting the turn to renewable sources of energy and products, such as biobased alcohols for fuel sources or feedstock for other chemical syntheses. The annual production rate of the prominent biobased alcohol, bioethanol, in the US is 16 billion gallons. Bioethanol is made from fermentation of corn starch or biomass, but this fermentation process leads to byproducts that need to be removed. Distillation and adsorption can help with the separation process, but the timing to regenerate/switch over to a new adsorption column is difficult to determine. Currently, the timing is determined using HPLC to measure the alcohol content, which takes 30-50 minutes and requires active human monitoring. Thus, there is a need to develop devices that can help monitor the distillation process and determine when the adsorption column needs to be switched. Researchers at Purdue University have developed a system and method for use of adsorption to purify biobased alcohol in an automated fashion with an integrated dielectric-based sensor to detect the optimal time to replace the adsorption column. The researchers propose adding the sensor to the rectifier distillate stream

Advantages

-Automated system and method; no human monitoring necessary

-Rapid analysis and only small sample required

-Uses commercial, off-the-shelf automotive flex fuel sensors

Applications

Technology ID
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Category
Chemicals & Advanced Materials/Green & Bio-Based Chemistry
GreenTech/Circular Economy & Waste Reduction
Robotics & Automation/Automation & Control

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-Development of automated systems for biobased alcohol refinement

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