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Energy and environmental impacts of phase change materials on hot drink consumption

A new generation of coffee/tea mugs, that utilizes phase change materials (PCM) to cool hot beverage rapidly to optimal temperature and then keeps the drink at this drinking temperature for hours, has been developed and recently become available in the market (e.g.: <https://lexolife.com/>). In addition to introducing a totally new drinking experience (always at the right temperature), they also can have significant impacts on energy and environment. In 2014, WRAP (UK waste watchdog) estimated that global levels of consumer-related food waste could double by 2030, which could take the cost of consumer food waste to more than US\$600 billion a year (WRAP CSC107-GEN, 2017). A part of this waste is due to the fact that consumers are throwing away too many discarded cups of tea and coffee. In the UK, for example, the wasted tea alone equated to £110 million poured down plugholes every year. Americans consume approximately 146 billion cups of coffee per year. According to a biannual coffee report from the U.S. Department of Agriculture, this can be reduced significantly if the waste can be eliminated. The traditional advice to reheat cold coffee/tea is frequently not practical (locations), neither is it “desirable” (effects on taste). Also the attempt to use single-cup brewing devices are widely criticized for having a negative impact on the environment. In contrast, the use of the “naturally-smart” mugs, provides an opportunity to enhance beverage enjoyment, to totally eliminate waste due to cold coffee/tea, and hence to save money and help reduce carbon emissions.

Biography

Bin Wu is an Industrial Engineering Professor at the University of Missouri, and Director of the Missouri Industrial Assessment Center. He is an internationally-recognized expert in the design and management of manufacturing and supply systems, and has written a number of books on the subject that have been adopted as standard undergraduate and postgraduate texts worldwide. He is the recipient of numerous awards. His research has been funded by the Missouri Department of Natural Resources, the Kauffman Foundation, the US National Science Foundation and the US Department of Energy.

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