An easy pill to swallow—new 3D printing research paves way for personalized medication

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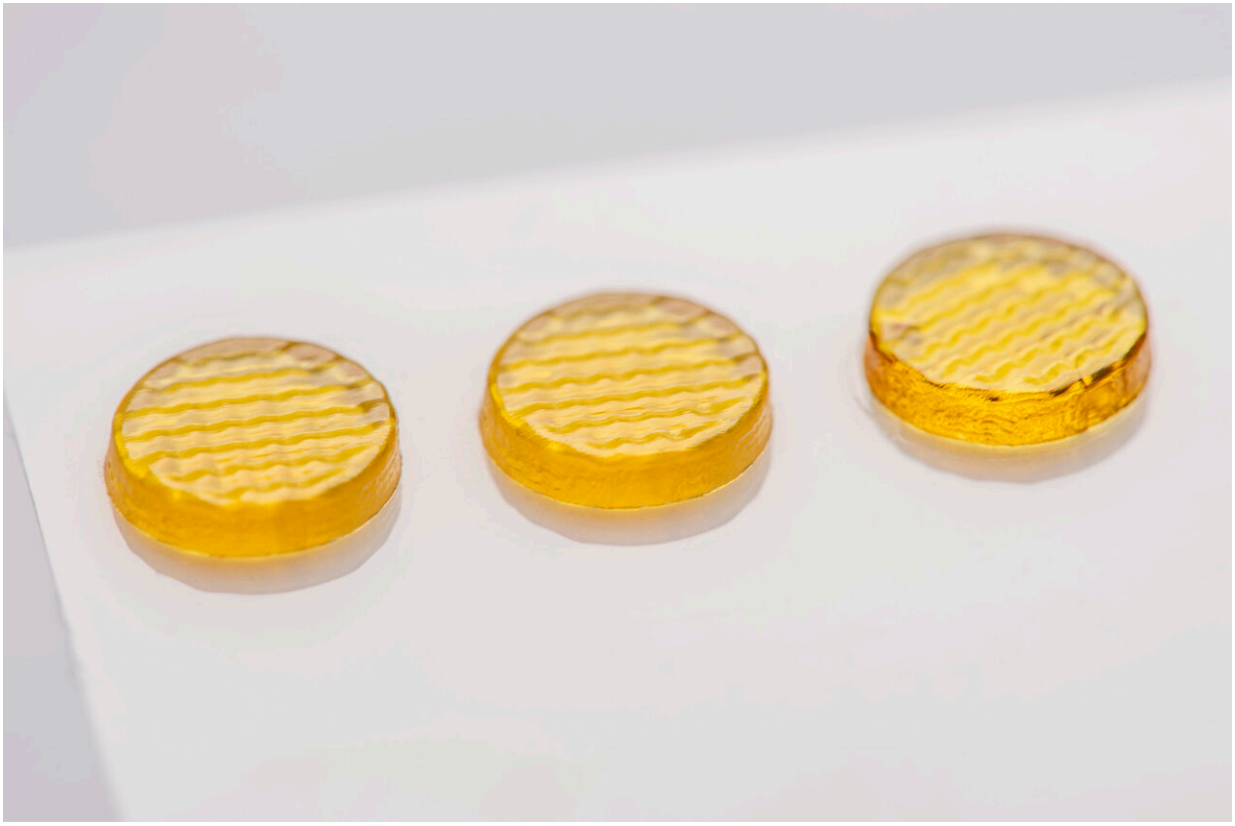

Credit: University of Nottingham

A new technique for 3D printing medication has enabled the printing of multiple drugs in a single tablet, paving the way for personalized pills

that can deliver timed doses.

Researchers from the University of Nottingham's, Centre for Additive Manufacturing have led research alongside the School of Pharmacy that has fabricated personalized medicine using Multi-Material InkJet 3D Printing (MM-IJ3DP). The research has been published in *Materials Today Advances*.

The team have developed a cutting-edge method that enables the fabrication of customized pharmaceutical tablets with tailored drug release profiles, ensuring more precise and effective treatment options for patients.

Using Multi-Material InkJet 3D Printing (MM-IJ3DP), tablets can be printed that release drugs at a controlled rate, determined by the tablet's design. This is made possible by a novel ink formulation based on molecules that are sensitive to ultraviolet light. When printed, these molecules form a water-soluble structure.

The drug release rate is controlled by the unique interior structure of the tablet, allowing for timing the dosage release. This method can print multiple drugs in a single tablet, allowing for complex medication regimens to be simplified into a single dose.

Dr. Yinfeng He, Assistant Professor in the Faculty of Engineering's Centre for Additive Manufacturing led the research, he said, "This is an exciting step forwards in the development of personalized medication. This breakthrough not only highlights the potential of 3D printing in revolutionizing drug delivery but also opens up new avenues for the development of next-generation personalized medicines."

"While promising, the technology faces challenges, including the need for more formulations that support a wider range of materials. The

ongoing research aims to refine these aspects, enhancing the feasibility of MM-IJ3DP for widespread application," Professor Ricky Wildman added.

This technology will be particularly beneficial in creating medication that needs to release drugs at specific times, making it ideal for treating diseases, where timing and dosage accuracy are crucial. The ability to print 56 pills in a single batch demonstrates the scalability of this technology, providing a strong potential for the production of personalized medicines.

Professor Felicity Rose at the University of Nottingham's School of Pharmacy was one of the co-authors on the research, she says, "The future of prescribed medication lies in a personalized approach, and we know that up 50% of people in the UK alone don't take their medicines correctly and this has an impact on poorer health outcomes with conditions not being controlled or properly treated. A single pill approach would simplify taking multiple medications at different times and this research is an exciting step towards that."

More information: Geoffrey Rivers et al, Enabling high-fidelity personalised pharmaceutical tablets through multimaterial inkjet 3D printing with a water-soluble excipient, *Materials Today Advances* (2024). DOI: 10.1016/j.mtadv.2024.100493

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