# Pilot Scale Binder Jetting for Printing Food

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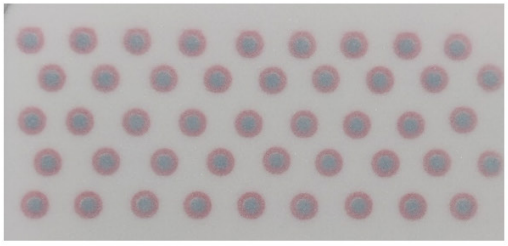
Binder Jet Printing (BJP) is a relatively underutilized method for 3D printing food products. Existing work focuses primarily on printing sugar and chocolate powder. BJP has a number of competitive advantages compared to extrusion-based printing methods. For personalized nutrition applications, for example, different nutrients and varying doses may be added to the food products on demand through the use and programming of multiple print heads. The BJP method does not require the formulation of an extrudable paste, and the loose powder also acts as support material, allowing the fabrication of more complex and overhang structures. However, the flowability of the powder feedstock and the jettability of the binder liquid must be characterized and understood. Leveraging a pilot-scale "HuskyJet" BJP printer at UConn, we have studied the processability of a number of powder and binder feedstocks and demonstrated the successful printing of two different types of food products. First, caster sugar was used as the feedstock powder. Two different aqueous binders, with and without glycerol, were used to print structures with a hard shell and soft core, showing the possibility of using 3D printing to engineering novel texture for food applications. Second, plant protein powder, as a sustainable food source, was studied as a potential feedstock. Several technical challenges have been overcome by selecting the appropriate powder and binder combination and optimizing the printing process. The printed structures have mechanical properties that are on par with existing food products, such as energy bars.

Custom-built HuskyJet 3D Printer



Binder jet 3D printing with two distinctly different liquid binders


Core shell food structures with tunable texture

UConn's custom-built HuskyJet 3D printer capable of producing core-shell food structures with tunable texture by multi-material binder jetting