Future Fabricated with Light:
Continuous Liquid Interface Production to Drive Additive Manufacturing

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Despite the increasing popularity of 3D printing, also known as additive manufacturing (AM), the technique has not developed beyond the realm of rapid prototyping. This confinement of the field can be attributed to the inherent flaws of layer-by-layer printing, and in particular, anisotropic mechanical properties that depend on print direction, visible by the stair-casing surface finish effect. Indeed "3D printing" is a misnomer: it is actually 2D printing over and over again. This lecture will describe a new advance in additive manufacturing that is rapid, continuous and no longer layer-by-layer that promises to advance industry beyond basic prototyping to 3D manufacturing. The new Continuous Liquid Interface Production technology (CLIP) harnesses light and oxygen to continuously grow objects from a pool of resin instead of printing them layer-by-layer. CLIP capitalizes on the fundamental principle of oxygen inhibited photopolymerization to generate a continual liquid-interface of uncured resin between the growing part and the exposure window. This interface eliminates the necessity of an iterative layer-by-layer process allowing for continuous production. CLIP technology raises the state-of-the-art in additive manufacturing in three ways:

- GAME-CHANGING SPEED: 25-100 times faster than conventional 3D printing
- COMMERCIAL QUALITY: produces objects with consistent mechanical properties
- MATERIAL CHOICE: enables a broad range of polymeric materials

Moreover, continuous production enables advantages including the fabrication of large overhangs without the use of supports, reduction of the stair-casing effect without compromising print time, and isotropic mechanical properties. Combined, these advantages result in multiple indicators of layerless and monolithic fabrication using CLIP technology.