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(43) **Pub. Date: Nov. 17, 2022**(54) **FOUR DIMENSIONAL PRINTED CIRCUIT  
BOARDS***H05K 1/11* (2006.01)*H05K 3/18* (2006.01)*C08L 1/02* (2006.01)(71) Applicant: **The Government of the United States  
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(US)(52) **U.S. Cl.**  
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*3/181* (2013.01); *C08L 1/02* (2013.01)(72) Inventors: **Jonathan D. Yuen**, Washington, DC  
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MD (US)(57) **ABSTRACT**(21) Appl. No.: **17/738,122**(22) Filed: **May 6, 2022****Related U.S. Application Data**(60) Provisional application No. 63/186,832, filed on May  
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Described herein are ultra-thin nanocellulose flexible electronic device on which SU-8, an epoxy material which can become highly stressed upon UV exposure, is printed on desired areas. Upon UV exposure and then release from the surface it is anchored on, the nanocellulose device will spontaneously self-mold into a desired form due to stress differences between the SU-8 and the nanocellulose sheet. The flexible electronics can be manufactured using standard printed circuit board processing techniques, including electroless metallization and soldering of surface mount components.

