

## Printing of a Passivation Layer for the Protection of Printed Supercapacitors

장서현, 남인호<sup>†</sup>

중앙대학교

(inhonam@cau.ac.kr<sup>†</sup>)

Manufacturing supercapacitors (SCs) by printing enables reduced material waste, easy customization, adaptability of form factor with application and high compatibility with other printed electronics systems. Lifetime, durability and stability are practical considerations to meet expectations besides the standard metrics of electrochemical performance. In this regard, passivation of the device is a critical aspect in all printed electronics but seldom considered. A printable passivation layer for printed SCs was developed with UV-curable cycloaliphatic epoxy resin which does not cause side reactions with other layers and provide protection from the ambient. The passivated SCs showed superior stability compared to the non-passivated device, and provided as high performance as the manually passivated control device. The observed protection behavior is consistent with the diffusion barriers calculated from DFT for water and oxygen molecules through the passivation layer. Furthermore, the printed passivation layer ensures normal operation in a vacuum environment so it can be useful in unusual atmospheric applications such as space exploration missions and remote area use.