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14. ABSTRACT

On-chip energy storage is a necessity for advancing the internet of things. In this work, on-chip electrochemical double layer capacitors are formed from anodized aluminum oxide bonded to Si wafers. Carbon nanotubes are deposited inside the pores of the AAO to act as EDLC electrodes with ionic liquid electrolytes. The processing-performance relationships of the fabricated EDLCs are studied, which indicates that previously unknown blockages in the pores during CVD may lead to decreased electrochemical area and therefore decreased performance. Analysis of electrochemical impedance spectroscopy allowed for more exact calculation of the electrochemically active area, and calculation of a much increased electrolyte resistivity within the pores. The increased resistivity may be the result of hydrophilic surface groups on the surface of the carbon.

15. SUBJECT TERMS
carbon nanotubes, anodized aluminum oxide, ionic liquid, supercapacitor, electrochemical impedance spectroscopy

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