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DC Corona Discharges in Liquids for Thin Film Deposition
BAKHTIER FAROUK, DION ANTAO, ALEXANDER FRIDMAN, Drexel University — Non-thermal plasma discharges have been extensively studied in gaseous media for various applications in sterilization and materials processing. The study of electrical breakdown in both conducting and dielectric liquids has gained interest due to various applications. Most studies on plasma discharges in liquids were done for applications in switching circuits, capacitors and film deposition. The discharges are unsuitable for many applications due to their thermal nature. Non-thermal discharges in liquids are relatively unexplored. In this study we investigate dc plasma discharges in liquids for a negative pin-to-plate electrode configuration. The discharge is characterized by voltage-current characteristics and visualization. The corona discharge is observed to deposit films on the anode surface when operated in tetraethyl orthosilicate (TEOS). The deposition of films and particles on the anode surface by the proposed method has introduced the possibility of using corona discharges as a novel method of materials deposition or surface modification directly in liquid phase. The proposed PECVD technique is encouraging because it is both simple and effective in depositing films without damaging the substrate material.

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