Fabrication of Transparent Electrodynamic Screens by Screen Printing

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***Abstract*— Development of a screen-printing process for fabricating prototype transparent Electrodynamic Screen (EDS) is presented. The advantage of fabricating EDS via screen-printing is that the method is scalable and is inexpensive. Screen-printing is widely used for Si-solar cell based photovoltaic modules production as applied to more than 80% of the current solar plant installations worldwide. However, the initial development of the screen-printing process, for an application such as EDS, requires extensive trial and error until the method can be optimized and automated. We report here screen-printing of EDS electrodes on borosilicate glass substrates. Silver-based ink was used for applying the conducting electrodes designed for three-phase pulsed voltage drive to operate the prototype EDS plates. Substrates were first treated using oxygen plasma to maximize adhesion of the conducting ink on the glass surface before printing the electrodes. Since three-phase drive is needed; we used a two-layer printing method incorporating dielectric ink of high resistivity. After printing the electrodes, we coated the surface of the electrodyanamic screen with a dielectric film. We report here the performance of the prototype EDS devices for removing dust particles as a function of the electrode design, materials used for conducting and dielectric inks, uniformity of the printing process, reproducibility of the EDS fabrication and its application to solar mirrors used in large-scale concentrated solar power (CSP) and concentrated photovoltaic (CPV) systems. The work was supported by the U.S. Department of Energy SunShot Initiative; under the award number DOE CSP EE0005794.**