## *ABSTRACT*

*Printable mesoscopic all-inorganic perovskite solar cell (p-MAPSC) is a creative application of perovskite solar cells with a unique architecture based on a triple mesoscopic layer (mp-$TiO_2$/$ZrO_2$/carbon) which is fully printed using the screen printing method, thus has the potential for large-scale production cost efficiency for industry. The p-MAPSC device structure uses $CsPbBr_3$-based perovskite which has superior stability under ambient conditions without any changes in color or shape, thus supporting the commercialization of perovskite solar cells. The $CsPbBr_3$ layer is deposited using the dip-coating method with a two-step method, which absorbs into the pores of scaffold layers. The mp-$TiO_2$ thin film is one of the main components as a scaffold for perovskite infiltration, requiring optimal physical properties are needed for effective perovskite conversion. This study aims to explore the effect of mp-$TiO_2$ thin film, through material characteristics on variations of transparent $TiO_2$ paste types (18 NR-T and 90-T) and solution concentrations (1:3; 2:3; and 3:3) in the form of layer thickness, optical properties, crystal phase, particle size, and porosity. Based on the results of this study, the best solar cell device performance measured using a sun simulator with a light intensity of 1000 W/$m^2$ (A.M 1.5G) achieved an efficiency of 4.21%, which was obtained from the variation of mp-$TiO_2$ 18NR-T with a concentration of 2:3.*



***Keywords**: Printable mesoscopic all-inorganic perovskite solar cell (p-MAPSC), screen printing, $CsPbBr_3$-based perovskite, mp-$TiO_2$ thin film, solar cell device performance.*