

## ABSTRACT

Mortar Cement is an important building material in any construction process today, as it is one of the essential elements in building work. However, industrial development causes the amount of pollutants to increase and has a negative impact on the environment, especially on buildings in the neighborhood, so the use of mortar is very vulnerable to environmental conditions. Therefore, it is necessary to make cement mortar that is dirt-repellent or self-cleaning to protect the mortar from dust, dirt, and water absorption that can damage it. One of these efforts is to utilize the photocatalytic effect of smart materials based on titanium dioxide ( $\text{TiO}_2$ ). The purpose of this study was to determine the characteristics of the  $\text{TiO}_2$  layer against the influence of environmental conditions, the effect on the contact angle formed on self-cleaning, the effect of photocatalysts on self-cleaning, and to determine the effect of the ideal  $\text{TiO}_2$  composition. The research was conducted by comparing self-cleaning between cement mortar coated with  $\text{TiO}_2$  and those not coated with  $\text{TiO}_2$ . This type of research is an experiment with independent variables. The composition of the  $\text{TiO}_2$  layer is made to vary, namely 2 grams, 4 grams, and 6 grams, and additional variations by mixing 1 gram of PEG 4000 from each  $\text{TiO}_2$  composition. And the composition of  $\text{TiO}_2$  is mixed directly on the cement mortar, namely 50 grams, 100 grams, and 150 grams. Self-cleaning testing using Methylene Blue impurity type. The best results of cement mortar surface conditions due to the self-cleaning photocatalyst process were obtained in sample with a  $\text{TiO}_2$  layer of 6 grams composition under the sunlight with an average percentage of impurity color density of 35.12%. While the results of contact angle testing on the surface of cement mortar is hydrophilic, with contact angle of  $19,5^\circ$  on cement mortar directly mixed with 150 grams of  $\text{TiO}_2$ .

**Keywords:** Photocatalyst, *self-cleaning*, mortar cement, contact angle,  $\text{TiO}_2$