## *ABSTRACT*

*Pre-study of monitoring $PM_{2.5}$ and $CO_2$ begin with developing real-time air quality measurement device based on low-cost sensor which is then used to analyze $PM_{2.5}$ and $CO_2$ concentration data. Monitoring $PM_{2.5}$ and $CO_2$ concentrations, and meteorological conditions such as temperature (T), relative humidity (RH), pressure (P), light intensity (l), wind speed (WS), wind direction (WD) activities was carried out in the Greater Bandung air basin on Mar. 12 – Apr. 25, 2019. $PM_{2.5}$, $CO_2$, and meteorological sensors have been calibrated in the Laboratory. The instruments were then placed in two locations (separated ±300 m horizontally and ±20 m vertically), namely Tokong Nanas Building as location 1 (L1) and Deli Building (L2), Telkom University, Bandung. A GSM module (SIM900A) is used for data communication every 2 minutes between microcontroller and cloud database. Data Logger is used for raw data. The results show that the same air mass in both locations has identified, except for some events that are affected by anthropogenic activities ($PM_{2.5}$ and $CO_2$ concentrations in L2 > L1) and wind speed/direction (the difference in $PM_{2.5}$ mass concentration due to time delay). The daily average $PM_{2.5}$ and $CO_2$ concentrations at L1 and L2 are 52 $\mu g\ m^{-3}$ and 580 ppm, and 70 $\mu g\ m^{-3}$ and 809 ppm. $PM_{2.5}$ and $CO_2$ mass concentrations relatively higher (±172 $\mu g\ m^{-3}$ and 916 ppm) at night due to a stable atmosphere (typical data from 20:00 to 3:00), lower planetary boundary layer, and mixed local emissions and transboundary air pollutants. Meanwhile, relatively lower $CO_2$ concentrations in daytime mostly occur due to the activity of vegetation which actively absorbs $CO_2$ in the photosynthesis process. It suggests that the performances of low-cost sensors can be used properly for air quality monitoring in the atmosphere.*



***Keywords**: $CO_2$, low-cost sensors, $PM_{2.5}$, potential temperature.*