電梯室內懸浮微粒之暴露研究

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本研究針對某大學內不同大樓之電梯進行室內懸浮微粒濃度調查及探討影響電梯內微粒濃度之影響因子，以瞭解師生及行政人員之微粒暴露程度。懸浮微粒(PM_{10}和 $PM_{2.5}$)濃度是使用兩台 Dust-Trak 微粒偵測儀來量測，共針對與外氣不同接觸形式之電梯進行為期六個月之調查。

研究指出電梯內 PM_{10} 懸浮微粒平均濃度分佈在 81.19～218.79 μg/m^3 間，$PM_{2.5}$ 平均濃度則介於 51.34～122.71 μg/m^3 間，此結果代表與外氣直接接觸之電梯內微粒濃度明顯受到外氣影響且濃度最高；相對地開空調之圖書館因密閉性佳，電梯內微粒濃度最低。電梯內懸浮微粒濃度隨著開門次數及搭乘人數增加而增加，顯示外氣入滲及人員進出帶入的微粒會增加搭乘電梯人員之暴露。

雖然本研究顯示部分大樓電梯內懸浮微粒濃度高於我國環保署公佈之室內空氣品質建議值，但由於師生搭乘電梯時間短暫，所以在此懸浮微粒平均濃度下，短時間微粒之暴露對於人體健康影響是很小的。

關鍵字：懸浮微粒，室內空氣品質，電梯

Exposure of Suspended Particulates in Elevators

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The aim of this study was to investigate the levels of indoor suspended particulate matters (PM) of elevators from different buildings in a local university. The effect of the exposure of PM on faculties, students and administrative were examined by different environmental factors. Two Dust-Trak aerosol monitors were used to determine the levels of PM_{10} and $PM_{2.5}$, respectively. In the six-month investigation, the air samples were continuously collected from the elevators where the elevators were installed inside of the buildings with air condition and without air condition, respectively. Meanwhile, the PM levels in the elevator placed outside of the building were analyzed as well.

The results found that the average concentrations of PM_{10} and $PM_{2.5}$ were in the range of 81.19 ~ 218.79 μg/m^3 and 51.34 ~ 122.71 μg/m^3, respectively. It indicates that the levels of PM were significantly increased while the air in the elevators was infiltrated from outdoor. However, under a closed space such as library, the PM levels were remained low. In addition, the finding shows that the PM concentrations increased with the increases of the operating frequencies and the loadings of the elevators.

In the study, the PM levels in some of the objective buildings were greater than the recommended values of indoor air quality (IAQ) by Taiwan EPA. However, since the times of staying in the elevators were relatively short, exposure under such levels of PM might have little health impact on human bodies.

Keywords: suspended particulate , indoor air quality, elevator