

The 54th Joint School Science Exhibition

Four F.3 and F.4 students participated in the 54th Joint School Science Exhibition held in the Hong Kong City Hall from 3rd to 8th August. The group proposed 'Chromvolt', which utilises the use of solar cells and photochromic glasses as a means of reducing energy consumption in buildings.

The student list is as below:

3C Ho Kit Chun

3C Leung Tsz Wang

4B Fan Cheuk Kiu

4D Or Chung Hymn Daniel

Introduction of project:

PH28



TSUEN WAN PUBLIC HO CHUEN YIU MEMORIAL COLLEGE

荃灣公立何傳耀紀念中學

Or Chung Hymn Daniel 柯頌謙
Leung Tsz Wang Raymond 梁子宏
Ho Kit Chun 何傑晉
Fan Cheuk Kiu 范焯橋



ChromVolt 遮光變電

Nowadays, the sunlight from the windows indoors affect our working quality, especially offices in skyscrapers. Moreover, the dazzling lights and ultraviolet lights emitted from the sun may cause health problems such as skin cancer and discomfort of the eyes. On the other hand, the consumption of energy in the office is high as a lot of machines are operating at the same time and a cooling system is frequently used in high power, which can be quite expensive with high emission of greenhouse gases. That's when the photochromic windows can be a solution.

By installing a solar panel system on top, the sunlight would come in use as a renewable energy source and help achieve an eco-friendly environment in the office. The photochromic glass panel on the front darkens when sunlight is shone in order for comfort of the eyes by making use of redox reactions. The double glazed windows system can reduce the conduction from the outside and such a narrow space inside prevents efficient convection, reducing the temperature gain inside and thus lower the reliance of air-conditioning.

For the limitations of the invention, the photochromic glass panels do not work well in cold environments and if the building has metal window frames the insulation would be less effective. And the generation of electricity would be limited by cloudy or dark sky and is dependent on when the sun shines.

室內窗戶的陽光會影響我們的工作質量，特別在高層數辦公室，直接受到陽光照射。此外，從太陽刺眼的燈光和紫外線會導致眼睛不適甚至引致皮膚癌等問題。另一方面，辦公室的能源消耗很高，因為許多機器需要同時工作，冷卻系統也大功率運作，導致溫室氣體排放量。

通過在上面安裝太陽能電池系統，陽光將用作可再生能源，並有助於在辦公室實現生態友好型環境。當陽光照耀時，前面的光致色玻璃面板會變暗，以氧化還原反應來阻擋刺眼的太陽光。雙層玻璃窗系統可以減少熱傳導，內部狹窄的空間可以防止高效的對流，降低內部溫度增益，從而降低對空調的需要。

本發明的限制，在於玻璃面板在寒冷的環境中效果不佳，如果建築物有金屬窗框，絕緣效果會降低。發電將受到天色的限制，並取決於陽光於何時照射以及照射的地方。