Methods of Forming Continuous Axis Varying Polariser and Retarder for Mechanical Variable Transmission Windows

HKUST | Reference: TTC.PA.1093 | Sept. 2018

Background

Windows are an essential part of buildings and vehicles. Traditionally, light transmission by a window is controlled by curtains or blinds. These devices achieve control by blocking all or part of the incident light and are independent of the structure of the window. Smart windows control the light transmission through the built-in structure. Smart windows can be further divided into two types: electronic and mechanical. Electronic smart windows, such as electrochromic windows and polymer dispersed liquid crystal windows, require electrical energy to work. Mechanical smart windows do not require electrical energy, but operate via the relative movement of indispensable components.

Technology Overview

The invention provides a method of fabricating continuous axis varying polariser film on mechanical smart glass. The method involves coating a photo alignment material on a substrate, placing the coated substrate on a linear moving device and exposing a side of the coated substrate to a polarised light source. The light irradiated onto the coated substrate through the polariser forms an orientated pattern layer.

Market Analysis

The global market for smart windows is expected to grow vigorously, with a predicted compound annual growth rate of over 14% in the next decade. One of the main factors driving this expansion is the global demand for more efficient energy loss. Almost half of the energy loss from office and residential buildings comes from traditional windows; therefore, the utilisation of smart window technology will lead to less energy expenditure overall. Another major driving force for the expansion of this market is the enhanced comfort and convenience that these technologies provide for the consumer. The need for such products is accelerated by the increase in global middle-class wealth.[1]

Benefits

- Energy saving—no electrical parts are required.
- Continuous adjustment of light transmission.
- Uniform light transmission through the whole window.
- Plastic substrate possible.

[1] Invention Evaluation Report, Methods of forming continuous axis varying polarizer and retarder for mechanical variable transmission windows (TTC.PA.1093) (InventionEvaluator.com, 2017).

Applications

- Outdoor-environment friendly windows
- Indoor privacy windows

Patents

- China Patent no.: 201811079500.3

Figures

Principle

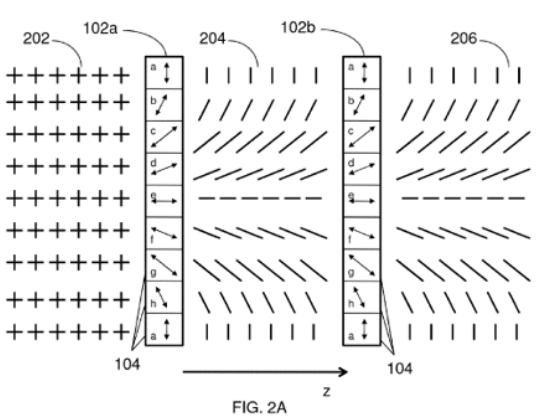


FIG. 2A

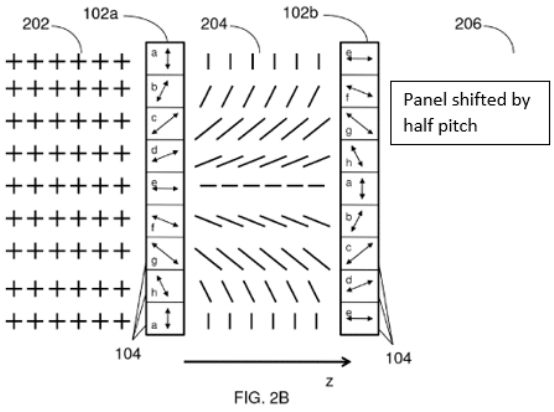
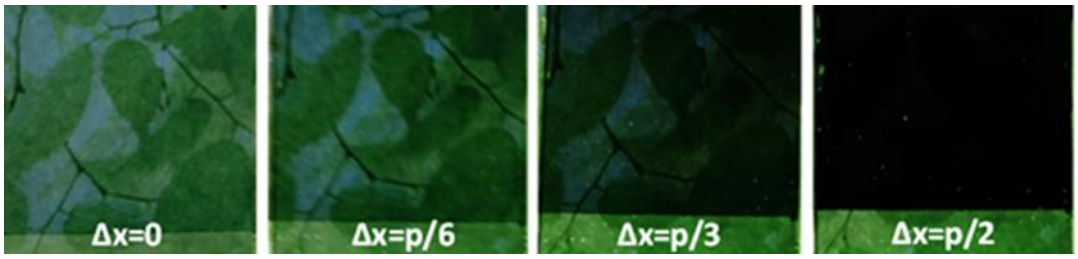


FIG. 2B

Transmission: $T(\Delta x) = cos^2(\Delta\theta) = cos^2(\frac{\Delta x}{p}\pi)$



Continuous transmission adjustment via small mechanical translation