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THEORETICAL MODELS OF PV-EC WINDOWS BASED ON THE ARCHITECTURAL ANALYSIS OF PV-EC TECHNOLOGIES

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Abstract
The paper provides an architectural analysis of the switchable PV-EC glazing technology based on combining photovoltaic (PV) technology with electrochromic (EC) glazing. The integration of these technologies is considered to constitute future-oriented façade solutions in shaping buildings that are energy-saving and environmentally friendly. The paper aims to define theoretical models of windows using PV-EC technology as solutions adequate from the architectural point of view. To achieve this goal, a comparative analysis of three PV-EC technologies was conducted, i.e., side-by-side (SBS) technology and tandem technologies, namely tandem solid technology (TST) and tandem liquid technology (TLT). The analysis covered functional aspects related to such issues as thermal and visual comfort, energy and aesthetics. The analysis led to extracting the features of the three compared technologies; consequently, their strengths and weaknesses were determined. As a result, seven window models were developed which, based on the above analysis and the insights derived from it, were recognized as the solutions in which the potential of PV and EC technology is best used. The dominant advantages of SBS, being the most developed technology and one with the greatest flexibility in construction applications, are indicated. The research is of a contributory nature, as it constitutes the basis for further numerical and simulation research. Such studies may prove useful to architects in making design decisions, especially at the initial design stages. However, at the current stage of technological development, the study mainly serves as an introduction to further research on improving the PV-EC properties towards integration with the building and its architecture.

Keywords: **PV-EC, switchable glazing, PV glazing, BIPV, smart windows, energy efficient buildings, green architecture**