



Engineering Advance

## Recent advancement in BIPV product technologies: A review

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## ABSTRACT

Application of building integrated photovoltaic (BIPV) technology in the building envelope gives an aesthetical and modern appearance. BIPV is a practical, innovative and promising technology for net zero emission buildings. This paper introduces the best in class of the BIPV products and their properties along with international guidelines and testing standards. BIPV products for rooftops, façades and windows have been highlighted in this paper. The properties of BIPV products incorporate solar PV efficiency,  $V_{oc}$ ,  $I_{sc}$ ,  $P_{max}$  and fill factor (FF). The life cycle sustainable assessment of BIPV module has been reviewed by examining energy payback time and GHG emission.

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## 1. Introduction

Solar photovoltaic installations can be installed on the building skin allowing the possibility to combine electricity generation with other functions of the building materials [1]. Following the advantages of building integration, more and more countries have set targets for using solar PV in building sector since PV integration in building facades represents a significant progress in urban solar PV applications [3]. The solar PV system not only save conventional

energy use, but also offsets the peak electricity generation from coal and oil and the emissions from diesel generators [5]. Energy saving is a very important determinant for using PV in buildings nowadays [7]. It is generally expected that in the next century PV will be able to contribute substantially to the mainstream power production, even though PV now is up to five times more expensive than grid power [9]. Solar PV technology is one of the elegant technologies available for the efficient use of solar power [11]. In future scope for solar photovoltaic application, there are four major factors must be considered viz. increase of efficiency, BIPV applications, cost reduction and storage system [13,25]. BIPV product transforms building from energy consumer to energy producer. In this advancement, product technology is required to be merged with BIPV technology for better performance [14]. The BIPV products become true construction ele-

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