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^{1.} Milorad BOJIC, ^{2.} Jasna RADULOVIC, ^{3.} Vesna RANKOVIC,
^{4.} Danijela NIKOLIC, ^{5.} Ljubisa BOJIC, ^{6.} Jasmina SKERLIC

FLEXIBLE THIN-FILM SOLAR PHOTOVOLTAICS: RESEARCH AND APPLICATION

^{1-6.} Faculty of Engineering, Kragujevac, SERBIA

ABSTRACT: It is expected that thin film photovoltaic technologies will play a major role in the world photovoltaic market in the near future. The use of flexible substrates offers new possibilities for the application of solar cells, for example for building integration. In addition, flexible cells are very thin and lightweight, which makes them also more flexible in use than rigid cells. One of the most important advantages of flexible solar cells, is the potential to reduce production costs. Development of photovoltaic thin film modules ensures a satisfying flexibility of the surface, and the possibility to design appropriate shapes. The future for efficient, lightweight, flexible and cost-effective thin film modules looks very promising.

Keywords: Flexible solar cells, building integration

1. INTRODUCTION

One of the most promising renewable energy technologies is photovoltaic (PV) energy conversion. PV energy conversion represents the direct conversion of sunlight into electricity. Commercial PV materials commonly used for PV systems include solar cells of silicon (Si), cadmium-telluride (CdTe), copper-indium-diselenide (CIS) and solar cells made of other thin layer materials. PV systems are still an expensive option for producing electricity compared to other energy sources, but many countries support this technology. Over the last five years, the global PV industry has grown more than 40% each year, [1].

Silicon is a leading technology in making solar cell because of its high efficiency. But many researchers, due to its high cost, are trying to find new technology to reduce the material costs for production of solar cells and thin film technology can be seen as a suitable substitution. However, the efficiency of solar cells based on this technology is still low, and researchers are intensively making an effort to enhance the efficiency, [2].

Flexible modules are light-weight and suitable for applications where weight is important, and they offer a much faster payback than products based on conventional photovoltaics [3]. It is expected that they will play a very important role in the world PV market in the near future. In this paper the advantages and perspective of the flexible thin film photovoltaic technology for building integration are pointed out.

2. ABOUT THIN FILM (TF) PHOTOVOLTAICS

Silicon is a leading technology in making solar cell due to its high efficiency. At present, over 80% of the world PV industry is based on c-Si and pc-Si wafer technologies. However, due to its high cost, in the past few years there have been efforts to reduce the material costs of production of solar cells and to till date, thin film technology can be seen as a good option. It is generally agreed that c-Si wafer technology would not be able to meet the low-cost targets, whereas thin-film technologies have the potential to provide a viable alternative in the near future.

