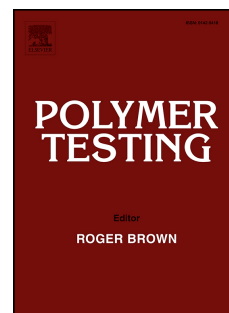


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Electrical-thermal-mechanical properties of multifunctional OPV-ETFE foils for transparent membrane buildings

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Abstract: ETFE (ethylene tetrafluoroethylene) foils integrated organic photovoltaic cells (OPV) have attracted considerable attention in recent years due to the achievement of sustainability. As building materials, multifunctional OPV-ETFE foils could produce electricity, store thermal energy and possess structural capability. In this case, electrical, thermal and mechanical properties coexist and influence each other due to photovoltaic/thermal effects. Understanding the fundamental mechanism is significant to analyze and design corresponding structures. This paper concerns coupled properties of OPV-ETFE specimens with controlled experiments. One-parameter and two-parameter analysis of two typical specimens are performed to investigate essential properties.

Experimental observations show that within normal working conditions, electrical properties are relatively independent but that thermal-mechanical properties are strongly related to each other. Yield stress, yield strain and elastic modulus are calculated from stress-strain curves; these mechanical properties are comparable with those of original ETFE foils at the same temperature. It is concluded from temperature-stress curves that yield point has a critical effect on

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