

Realization of a prototype of an experimental apparatus for photovoltaic waste recycling finalized to recovery of materials

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The deployment of photovoltaic (PV) panels has been steadily increasing in the global market for more than 20 years. In the meantime, a considerable amount of these PV panels reached their end-of-life (EoL) and consequently need a proper waste management for the recovery of their valuable components and materials. In the framework of Project IEMAP (Italian platform for the accelerated discovery of materials for energy project), funded by the Italian Ministry of the Environment within Mission Innovation Program, and in particular in the WP4 (Materials for photovoltaics), this research implemented a recycling apparatus based on a joint ENEA – Beta-Tech Srl, Italian patent (n° 102017000033488) with low energy consumption and low emissions”), issued on the 10-07-2019 entitled “Low power consumption and environmental impact method for the recovery of the main EoL crystalline silicon PV panels components”. The apparatus installed in ENEA Casaccia Research Centre on March 2023 consists of an aluminium structure within which a semi-automated motorised mechanism separates the polymeric layers such as the backsheet and the ethylen vynil acetate (EVA) film. This separation allows, additionally, the recovery of the silicon crystalline cells and the electric contacts. Compared with other available methods, this apparatus reduces power consumption and gaseous emissions. The scope of this presentation is to illustrate this process and its mode of operation. Besides, preliminary experimental results on valuable recovered materials and components will be provided.

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