MELTING OF EVA UNDER CO_2 PRESSURE FOR SOLAR PANEL RECYCLING

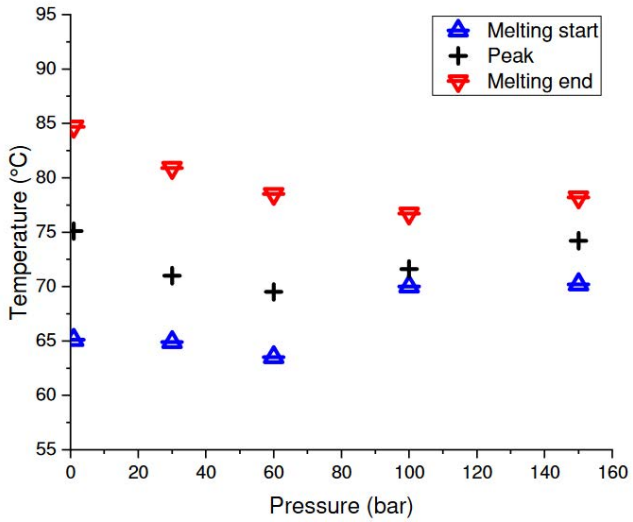
INTRODUCTION

Apart from the active photovoltaic (PV) material, solar cells are made of several components with separate functions. The PV material is typically encapsulated in a transparent material, usually EVA polymer, to protect it from deterioration.
Recycling such layered material is challenging. A process to separate PV material from EVA has been proposed by researchers. It consists in inducing delamination by applying high pressure of CO_2. In this study, the effect of CO_2 pressure on melting properties of EVA was studied using a Calvet Pro instrument.

EXPERIMENT

- Sample: EVA-28 (10mg)
- Cell: High pressure cell connected to a high pressure syringue pump
- Instrument: Calvet Pro (formerly Sensys Evo)
- Condition: Heating to 10°C/min
- Atmosphere: CO_2 (1bar, 30bar, 60bar, 100bar, 150bar)

RESULTS



Upon heating, a melting endotherm is measured above 65°C. The onset temperature and the width of the melting peak are modified by the CO_2 pressure.

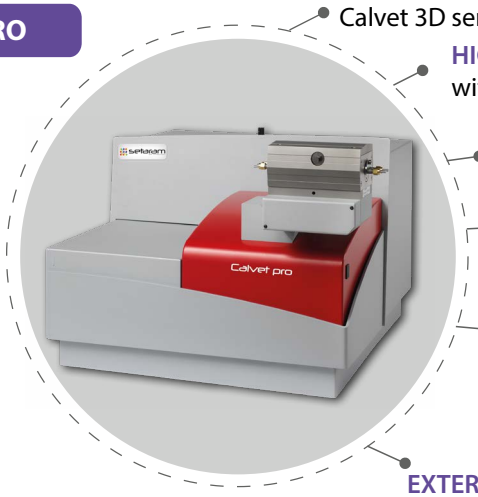
Pressure induces a decrease in the melting range. This is explained by its impact on the polymer crystallinity and the presence of CO_2.

This test is useful to evaluate the effect of CO_2 pressure on the structure and transformation of EVA and to select the appropriate process conditions for solar panel recycling.

Axel Briand et al., CO2 absorption into a polymer within a multilayer structure: The case of poly(ethylene-co-vinyl acetate) in photovoltaic modules, The Journal of Supercritical Fluids, Volume 179, 2022, 105380, ISSN 0896-8446

INSTRUMENT

CALVET PRO



HIGHEST HEAT MEASUREMENT ACCURACY
Calvet 3D sensor based on thermocouples with Joule effect calibration

HIGHEST MASS VARIATION ACCURACY
with its optional Hang-down Symmetrical Beam Balance

SUB-AMBIENT TO HIGH TEMPERATURE OPERATIONS
with solutions from -120 to 830 °C

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to perform even the most demanding experiments using one instrument :
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- pressure resistance, measurement or control
- packed bed reactor experiments

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