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# 臺灣大學應用力學研究所
# 演 講 公 告

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主 講 人：李坤穆教授
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講　　題：鈣鈦礦太陽能電池在太空應用的機會與挑戰

摘　　要：　如附件

主 持 人：　陳建彰教授

時　　間：　113年09月23日（星期一）下午2時20分開始

地　　點：　臺灣大學應用力學研究所國際會議廳

☆☆ 歡 迎 聽 講 ，敬 請 張 貼 ☆☆

# 鈣鈦礦太陽能電池在太空應用的機會與挑戰

李坤穆教授

## 摘要

Metal halide perovskites have sparked considerable interest in photovoltaic (PV) research due to their exceptional optoelectronic attributes. The remarkable power conversion efficiency (PCE), superior power-to-weight ratios, adaptability to flexible substrates, and robust radiation tolerance position perovskite solar cells (PSCs) as a compelling option for futuristic space PV applications. In this study, we enhance the stability of PSCs by incorporating the additive poly (vinylidene fluoride-co-hexafluoropropylene) (PVDF-HFP) into the perovskite composition and evaluate their performance under vacuum and gamma-ray irradiation conditions. The fluorine content in PVDF-HFP establishes strong hydrogen bonding with the perovskite's organic cations and coordination bonds with Pb2+ ions, facilitating effective defect mitigation within the perovskite matrix. PVDF-HFP PSCs showed a marked increase in PCE of 22.14%, comparing to 19.85% for the pristine one. Furthermore, PVDF-HFP PSCs retained 70% of their initial PCE after 600 hours in a vacuum environment (2×10-7 torr). Additionally, it exhibited strong resilience to gamma-ray exposure. These results indicate that the integration of PVDF-HFP as an additive in perovskite solar cells significantly enhances their stability and performance in the harsh space condition.