

Predicting Optimal Solar Cell Design for Enhanced Degradation Resistance based on Environmental Conditions Using Machine Learning

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Abstract:

This research aims to develop a machine learning based predictive model to optimize the selection of solar cell materials for perovskite solar cells (PSCs) based on environmental conditions. We explore how machine learning models can improve the efficiency and longevity of PSCs. We consider the environmental condition such as existence of O2, humidity, stored conditions and desired efficiency of the PSC to be the feature space for our predictive machine learning model. After evaluating some renowned machine learning algorithms for our predictive model, the Decision Tree Regression outperforms other algorithms. Our machine learning algorithm is designed to forecast an optimized architecture for PSC capable of enduring specific environmental conditions, ensuring a maximum tenure before experiencing an 80% drop in initial efficiency. By integrating machine learning techniques into our research is to improve the efficiency and lifespan of solar energy systems, thereby advancing sustainable energy solutions.

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