DETERMINATION OF CHEMICAL AND OPTICAL PROPERTIES OF 2D HYBRID PEROVSKITE $(C_6H_{10}N_2)PbBr_4$ AND $(C_6H_{10}N_2)PbI_4$ IN LIQUID FORM AND CRYSTAL FORM UNDER UV-VIS, FTIR, AND XRD AS A MATERIAL FOR SOLAR CELL

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ABSTRACT

A new material, perovskites, is introduced, which experts believe may provide the most exciting potential for solar cells in the near future. However, perovskite cells' strength and stability must be addressed. Despite several attempts to make perovskite solar cells in ambient air, the power conversion efficiency remains poor as the material's stability tend to get influenced by the normal atmosphere. In this thesis, a 2D hybrid perovskite was explored and alternatively generated by using reflux technique in ambient air. The generated material was systematically investigated as a promising light-harvesting material for perovskite solar cells. Generally, the performance of the formed 2D perovskite was examined under Ultraviolet–visible spectroscopy, Fourier-transform infrared spectroscopy, and X-ray diffraction. The optical energy band measured for two samples of 2D perovskite was 3.69 eV and 2.94 eV. The presence of N-H, N-H bonding & aromatic ring (Ar-H) in the formed sample was analyzed by Fourier-transform infrared. Under X-ray diffraction, both sample exhibit well-crystallized & equally spaced in the diffraction narrow peaks. The results demonstrate that the 2D sample fits the requirements for the light-harvesting material.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

Global energy crises and pollution have become a censorious factor for humans as a result of industrial progress. Human beings, by nature, are continually trying to find a fresh solution to a problem. As a result, in order to address these global energy crises, we must look for novel materials that may be used to produce effective alternative renewable energy sources. The United Nations General Assembly (UNGA) approved the Sustainable Development Goals (SDGs) in 2015, providing a powerful framework for international cooperation to create a sustainable future for the earth. The 17 SDGs and associated 169 goals, which are at the heart of "Agenda 2030," chart a course to protect the planet's environment. Sustainable energy is critical to the achievement of Agenda 2030's goals (Gielen et al., 2019). The global energy goal has three core objectives: ensuring affordable, dependable, and universal access to modern energy services; significantly increasing the amount of renewable energy in the global energy mix and doubling the global pace of energy efficiency improvement (Gielen et al., 2019). An earlier analysis of future energy routes found that improving energy availability, air quality, and energy security while avoiding serious climate change is technically possible. In fact, a variety of different resource, technology, and policy combinations have been discovered to be capable of achieving these goals (Gielen et al., 2019).