



Ola



**Director de tesis:**  
**Co- Director de tesis:**

Dr. J Oracio Cuauhtémoc Barbosa García  
Dr. Enrique Pérez Gutiérrez

**Sinodales:**

Dr. Diego Solís Ibarra  
(Evaluador externo - IIM – UNAM, Secretario)

Dra. Ma. Concepción Arenas Arrocena  
(Evaluador externo - ENES – UNAM, Vocal)

Dr. José Luis Maldonado  
(Evaluador interno, Presidente)

**Tesis:**

**“ANALYSIS HYBRID PEROVSKITE FILMS (MAPBI 3 ) FABRICATED BY THE ONE AND TWO-STEPS METHODS”**

**Resumen:**

In the field of new technologies for renewable energy production, hybrid solar cells based on organic-inorganic perovskite material (HPSC) are now in the way to become a new real alternative. However, in the fabrication of perovskite films to be used as active layer in HPSC, some parameters like homogeneous morphology and pure crystallization should be controlled because they can affect the conversion efficiency of devices.

In this work, the one-step and the two-step methods (with close-spaced sublimation and spin-coating with sequential deposition) were used to deposit MAPbI<sub>3</sub> perovskite films. For both methods, there are several variables to control the perovskite formation and film quality. The influence of anti-solvent, the time for its addition, and the annealing temperature on the features of perovskite films were studied for the one-step method. The temperature for deposition of the inorganic film was studied for the close-spaced sublimation method, and the time that MAI-solution remains onto the PbI<sub>2</sub> film before the spin process began was studied for spin-coating with sequential deposition methods.

The morphology, the UV-Vis absorption spectra, and the XRD pattern for each film were analyzed to determine the film quality.

The MAPbI<sub>3</sub> perovskite films were used as the active layer in HPSCs with inverted architecture, the average photovoltaic performance of the devices was affected by the film features. In addition, the electron transport layer and counter electrode interface generated by the use of an alternative cathode was also studied. It was found that a poor physical contact at the ETL/CE interface does not drastically affect the efficiency of the device.