Textured Mo Rear Electrodes for $CuIn(S,Se)_2$ Solar Cells Applications

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$Cu(In_xGa_{1-x})(S_ySe_{1-y})_2$ (CIGSSe) based materials, due to their high light absorption coefficient and good radiation stability, are the most promising absorber materials for thin film solar cells. To reduce the fabrication costs, using low temperature, non-vacuum processes such as nanoperticles precursors for the absorber layers formation could reduce the materials usage and the equipment costs compared with the traditional high vacuum processes. However, one of the major drawbacks of the vacuum-free process is the poor efficiency performance. To overcome this issue, utilizing of textured back electrode provide a chance to enhance the light scattering and thus lengthen the effective light path.

In this work, we fabricate textured Mo back electrode by direct sputtering of Mo thin films on top of anodic aluminum oxide substrates, which could sustain high temperature during the grain growth of CIGS thin films, providing a good adhesion of Mo thin film. In addition, the method would generate textured Mo electrodes, which acts as a random textured back reflector to enhance the light scattering and lengthen the optical path. The $CuIn(S,Se)_2$ absorber layers were formed after the post-seleniztion of the $CuInS_2$ nanoparticles on top of the textured Mo back electrodes. Finally, solar cells base on the textured Mo electrodes were fabricated and characterized.