Supporting Information

Amorphous Precursor Compounds for $CuInSe_2$ Particles Prepared by a Microwave-Enhanced Aqueous Synthesis and Its Electrophoretic Deposition

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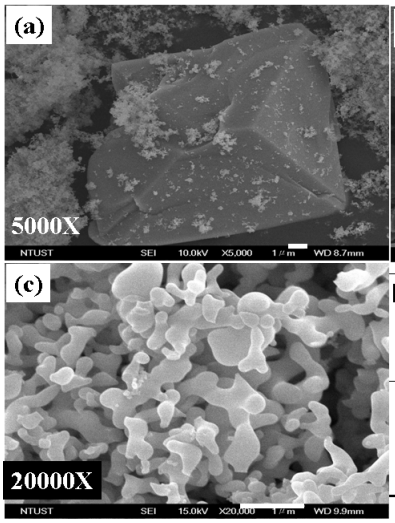
For comparison with microwave synthesis, the amorphous precursor compounds for $CuInSe_2$ particles were synthesized by autoclave in 180 ^oC at different reaction time. The morphology of the amorphous precursor compound that was prepared by autoclave is shown in Figure S1. The large particles shown in Figure S1 (a) and (b), may be due to the by products presented with insufficient amount of indium as a result of low reaction times and heating effect. Based on our experimental results, relatively uniform morphology of the amorphous precursor compounds synthesized by hydrothermal method using autoclave can be only obtained for at least 10 hrs reaction time while using microwave technique, we obtained a uniform morphology of the amorphous precursor

compounds at 180 ^{o}C for 30 mins reaction time, which shows a great contribution for low cost, short reaction time and scale up production.



(d)

Reaction time (hrs)	EDX Elemental analyses (atomic %)		
	Cu	In	Se
1	39.30	18.14	42.46
5	48.34	5.18	46.48
10	28.75	20.96	50.28

Figure S1. The SEM image (a-c) and EDX results (d) of the amorphous precursor compounds synthesized by autoclave in an aqueous solution at 180 ^{o}C with different reaction time (a) 1hr, (b) 5 hrs and (c) 10 hrs. Scale bars of (a) 1 μm, (b) 10 μm and (c) 1 μm.

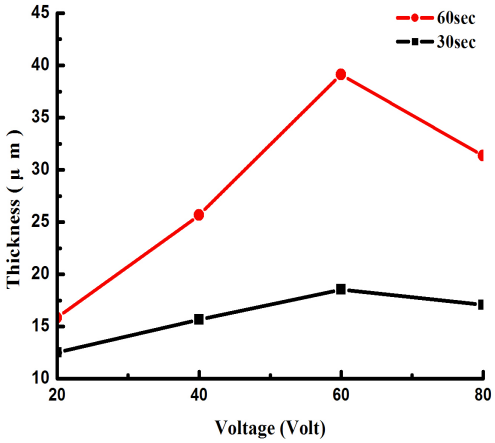


Figure S2. The thickness of $CuInSe_2$ films prepared by electrophoretic deposition of amorphous precursor compounds at different applied voltage and deposition times.

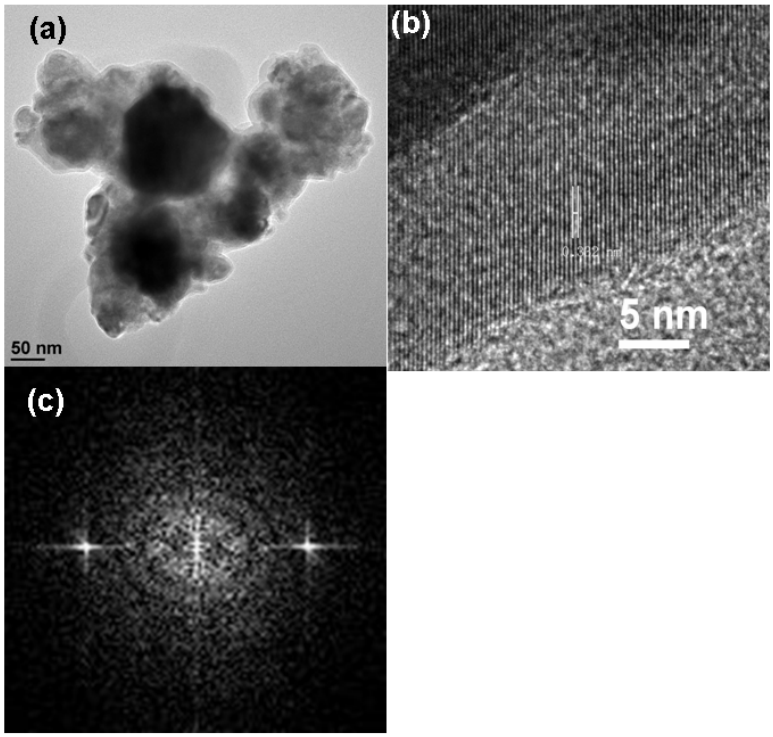


Figure S3. TEM image (a), HRTEM image (b) and the corresponding crystallographic diffraction patterns (c) for the $CuInSe_2$ films prepared by electrophoresis deposition of the amorphous precursor compounds followed by annealing at 600 ^{o}C for 10 hrs**.**

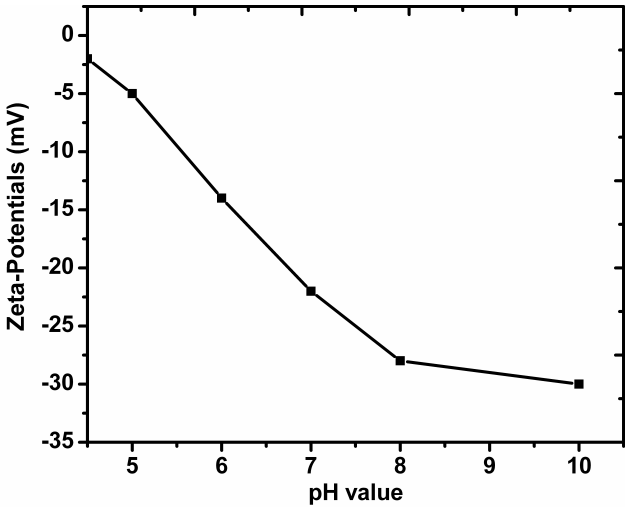


Figure S4. The zeta potential of the suspension of amorphous precursor compounds in the mixture of solvents (acetone and ethanol) as a function of the pH value. The concentration of the amorphous precursor in the suspensions was 10 g/l.