CHAPTER 5

CONCLUSIONS

5.1 Cadmium sulfide (CdS) synthesized via microwave plasma

Hexagonal cadmium sulfide (CdS) crystals were synthesized from 1:1, 1:2, and 1:3 molar ratios of Cd and S powders by a 900 W microwave plasma for 20-140 min. By varying the molar ratios of Cd:S and lengths of time, the products became pure crystals at 1:2 molar ratio of Cd:S for 120 min and 140 min. The phase, nanocrystals and its longitudinal optical modes of 1LO and 2LO were detected at 303 and 605 cm^{-1} that intensity of the first harmonic is stronger than that of the second. Photoemission was determined to be 537 nm, and direct energy gap to be 2.47 eV for 120 min, and 2.36 eV for 140 min.

5.2 Cadmium telluride (CdTe) synthesized via microwave plasma

Cubic cadmium telluride (CdTe) crystals were synthesized from 1:1molar ratios of Cd and Te powders by a 900 W microwave plasma for 10, 20 and 30 min. By varying the reaction time (lengths of time for irradiation), the products became pure crystals at all conditions. The energy band gap (E_g) were determined by extrapolation the linear portion corresponding to 1.80 eV and 1.65 eV for 10 min and 30 min, respectively. The Raman shifts corresponding to the fundamental transverse optical (1TO) and longitudinal optical (1LO) vibrations at 140 cm^{-1} and 169 cm^{-1}, respectively.

5.3 Zinc telluride (ZnTe) synthesized via microwave plasma

Cubic ZnTe nanocrystals were successfully produced by an inexpensive solid-state synthesis using 600 and 900 W microwave plasma. The chemical reaction of 1:1 molar ratios of Zn:Te conditions were proceeding for 30 min. To save energy consumption, the synthesis using a 600 W were used. The phase, nanocrystals and its longitudinal optical modes of 1LO, 2LO and 3LO were clearly detected for the products produced using 1:1 molar ratios of Zn:Te for 30 min. The products were composed of a number of irregular nanoparticles in clusters. The average particle size which calculate via scherrer's equation around 51.729 nm and 51.734 nm for 600 and 900 W, respectively. Their photoluminescence was the same green emission centered at 563 nm (2.204 eV), possibly associated with point defects at 0.46 eV above the valence band edge.

5.4 CdTe-GPE composited electrolyte on quasi solid-state ZnO Based Dye Sensitized Solar Cells

The quasi solid-state ZnO DSSCs with different weight percent of cadmium telluride nanoplates were mixed to CdTe-GPE composite electrolyte found that the gel polymer nocomposited electrolyte with increasing of weight percent of CdTe nanoplates powder from 0-0.10 wt% CdTe-GPE electrolyte is correlated with the increase in the V_{oc}, J_{sc}, *ff* and the solar conversion efficiency (η) of this device. At 0.10 wt% CdTe-GPE electrolyte, the performance showed at the highest in efficiency.

5.5 ZnTe-GPE composited electrolyte on quasi solid-state ZnO Based Dye Sensitized Solar Cells

The quasi solid-state ZnO DSSCs with different weight percent of zinc telluride nanostructure were mixed to ZnTe-GPE composite electrolyte found that the gel polymer nocomposited electrolyte with increasing of weight percent of ZnTe nanoplates powder from 0-0.20 wt% ZnTe-GPE electrolyte is correlated with the increase in the V_{oc}, J_{sc}, *ff* and the solar conversion efficiency (η) of this device. At 0.20 wt% ZnTe-GPE electrolyte, the performance showed at the highest in efficiency. The DSSCs with multi-wall carbon nanotube (MWCNT) counter electrode demonstrated nearby efficiency with using the platinum (Pt) counter electrode.