CHAPTER 5

CONCLUSION

5.1 $SrWO_4$ by electrospinning

$SrWO_4$–PVA spiders' webs were synthesized from strontium acetate, ammonium metatungstate hydrate, and different contents of poly (vinyl alcohol) (PVA, 125,000 MW) by the +15 kV direct voltage electrospinning process. In the present research, the $SrWO_4$–PVA spider's web synthesized from the solution containing 1.3 g PVA were further calcined in air at 300 ^oC, 400 ^oC, 500 ^oC and 600 ^oC for 3 h. At 600 ^oC calcination, the product was tetragonal scheelite structured $SrWO_4$ nanofibers shaped like a spider's web with the luminescence emission of 439–441 nm, and direct energy gap of 4.47 eV—one of the promising products for a wide variety of applications.

5.2 $MgWO_4$ by electrospinning

The mixture of 4.5 mmol $(CH_3COO)_2$ $Mg{\cdot}4H_2O$, 4.5 mmol $(NH_4)_6W_7O_{24}{\cdot}4H_2O$ and 1.3 g PVA was electrospun through a +15 kV direct voltage to form $MgWO_4$–PVA fibers, which were followed by 700 ^oC calcination for 3 h to form interconnecting facet nanoparticles of $MgWO_4$ along. By increasing the calcination temperatures at 700 ^oC the best pure phase monoclinic structured $MgWO_4$ by comparing its JSPDS database. $MgWO_4$ at 700 ^oC calcination, the indirect band

gap Eg of the $MgWO_4$ fibrous web was determined to be 4.19 eV and 461 nm PL emission – the promising nanofibers for a variety of applications.

5.3 $MgMoO_4$ by electrospinning

$(CH_3COO)_2Mg{\cdot}4H_2O$ and $(NH_4)_6Mo_7O_{24}{\cdot}4H2O$ mixtures containing different contents of PVA were electrospun by a direct high voltage to form fibrous webs of $MgMoO_4$–PVA, which was followed by high temperature calcination to form fibrous web of $MgMoO_4$ nanoparticles. Weight loss of the M3 $MgMoO_4$–PVA fibrous web tended to terminate at 519 ^oC and above. At 600 ^oC and 3 h calcination, the web was the best pure $MgMoO_4$ crystals, with 50–100 nm fibrous diameters and 20–50 nm particle sizes. FTIR asymmetric stretching modes of Mo–O–Mo were detected at 970, 893, 835, and 736 cm^{-1}, and two strong ν_1(Ag) Raman symmetric stretching modes at 962 and 949 cm^{-1}. The direct Eg of the M3 $MgMoO_4$ fibrous web was determined to be 5.15 eV—a promising material for a variety of applications.

5.4 $SrMoO_4$ by microwave-hydrothermal

$SrMoO_4$ hierarchical nanostructures were successfully produced by the one step microwave-hydrothermal process. The products were characterized by XRD, SAED, TEM, SEM, Raman, and PL spectroscopy. The XRD patterns revealed pure phase tetragonal scheelite structured $SrMoO_4$ by comparing its JSPDS database. By increasing the power of microwave irradiation or prolonged times, the crystalline $SrMoO_4$ and grain size were improved and larger. Their morphologies were observed by SEM and TEM that show donut-like or flower-like $SrMoO_4$, controlled by the

starting materials. Raman spectra presented the vibration of lattice at the same wavelength of 838–841 cm^{-1}, and the energy gap of 3.92 eV.