

Controlling the size of CdSe-nano particles by simultaneous application of high Ar/He gas pressure and fast evacuation

Z. Shadrokh, A. Yazdani, F. Karami

Tarbiat Modares University, P.O.Box: 14155-175, Tehran, Iran

negin_kamali6184@yahoo.com

It is suggested that, when the grain and domain size becomes comparable to or smaller than the characteristic length scale of interaction process, the shape and surface effect (which are the main controlling parameters of biomedical applications) play an important role [1, 2]. But, the relation of the grain boundaries and domain walls as well as the cluster size to the characteristic length scale of interaction processes, which can be due to the exchange correlation energy, are still a key issue of fundamental researches for understanding the dimensions of nanoparticle scales [3, 4].

Although it is well understood that the grain size or domain walls are dependent to the imperfections of crystalline materials which could be also resulted from the method of preparation, “fast” or “slow”, as well as the homogeneity of preparation process which are controlled by the ligand field as well as the bond strength, (“length” and “bond angle”) of the contributing elements (the primary purity of elements). Hence based on “the evaporation in vacuum by rotor system” method we have simultaneously applied (a) high Ar/He gas pressure flow, (b) fast evacuated evaporation and (c) evaporation by heating the liquid surface in vacuum.

Therefore the effect of the following competing parameters which could be important factors, define by prevention of aggregation (agglomeration) of nanoparticles biological compatibility, are considered;

- 1) Increasing the energy gap of the inter particle correlation which is related to the decreasing of nanoparticle size, named the geometrical constraints of quantum – size effect, could be a useful parameter which prevents the aggregation of nanoparticles[5] .
- 2) Because of the atomic-electronic structure of zinc blend, as bond length and bond angle, the formation of structure could have some imperfections with vacancies at certain sites which leads to distortion of atoms in vicinity of the vacancies .
- 3) A shift in electronic transitions to higher energies which can cause dangling bond and
- 4) Increasing of the oscillator strength with decrease in particle size.

It should be mentioned that in each case the induced polarized force as well as magnetic susceptibility which is due to the antisymmetry of spectral wave function must be regarded [6].

However in order to investigate the effect of suggested character by applying “the evaporation in vacuum by rotor system” preparation method the X-ray pattern and photoluminescence IR and FTIR are studied for the prepared CdSe.

References:

- [1] K.F.Berggren and I.I.Yakimenko, Phys.Rev.B **66**, 085323 (2002)
- [2] N.Sanz, P.L.Baldeck, and A.ibanez, Synth. Met. **115**,229 (2000)
- [3] M. Rutnakornpituk, et. Al. Polimer **43**, (2002), 2337
- [4] A. Jordan, et. Al. J. Magn. Mater. **194**, (1999) 185
- [5] Victor I.Klimov ,Los Alamos Science ,**Num 28**(2003)
- [6] S. Neeleshwar, et. Al, Physical Review B. **71**, (2005) 201307(R)