Nano structured materials-synthesis, properties, self assembly and applications
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Module 2, Lecture 9 :Spray Pyrolysis

Problem :

1. What is spray pyrolysis? (an aerosol process that atomizes a solution and heats the droplets to produce solid particles)
2. What is the condition of the precursor that is used in this method? (It should dissolve in the liquid but should not react with it)
3. What is the condition of the product that is formed in this method? (It must not dissolve in the liquid and must not react with it)
4. What are the variables that are involved in this method that affects the final product? (solute concentration, atomization technique, temperature, temperature gradient, residence time in furnace, carrier gas)
5. What is the droplet size in pressure type of atomizer? (10-100 micrometer)
6. What is the droplet velocity that one can achieve by using ultrasonic atomizer? (0.2-0.4 m/s)
7. Which type of atomizer gives the minimum droplet size? (Nebulizer and electrostatic)
8. Which type of atomizer gives the narrow range of droplet size? (Nebulizer)
9. What are different stages involved in spray pyrolysis? (evaporation, precipitation, drying, decomposition and sintering)
10. One gets _____ particle at low temperature and at high concentration of solute. (dense)
11. What should be the condition for obtaining hollow particles in spray pyrolysis? (high rate of solvent evaporation relative to the diffusion of the precipitate)
12. Nanoparticles with size _____ are difficult to prepare in spray pyrolysis. (< 100 nm)
13. What are the advantages of using salts in spray pyrolysis? (prevents agglomeration)
14. What is the diameter of the jet of the liquid cone in electrospray pyrolysis? (1 nm to micrometer)

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Solution:

1. an aerosol process that atomizes a solution and heats the droplets to produce solid particles
2. It should dissolve in the liquid but should not react with it
3. It must not dissolve in the liquid and must not react with it
4. solute concentration, atomization technique, temperature, temperature gradient, residence time in furnace, carrier gas
5. 10-100 micrometer
6. 0.2-0.4 m/s
7. Nebulizer and electrostatic
8. Nebulizer
9. evaporation, precipitation, drying, decomposition and sintering
10. dense
11. high rate of solvent evaporation relative to the diffusion of the precipitate
12. < 100 nm
13. prevents agglomeration
14. 1 nm to micrometer