



Droplet Lifetime under Spray Pyrolysis Deposition Conditions

M. Khammar*, S. Guitouni, N. Attaf, M.S. Aida

Department of Physics, Mentouri Brothers University
Thin Films and Interfaces Laboratory, Faculty of Science, Constantine, Algeria

Abstract: In this paper, the evaporation of sprayed aqueous fine droplet containing zinc chloride ($ZnCl_2$) has been studied through the space limited by the droplet generator and the hot substrate surface. Behavior of moving droplet on various hot atmospheres condition has been investigated by using Runge-Kutta method. The differential equations system of droplet rate evaporation, diameter and temperature was solved. The effects of hot air temperature, initial droplet diameter and salt concentration were investigated. We found that, through its transportation on hot air, the droplet size decreases differently with the surrounding medium. A varied space temperature from hot substrate to the generator nozzle droplet leads to more increasing in the droplet surface temperature than that of isothermal one. The evolutions of droplet size reduction in spray medium can be approximated by parabolic variations. Decreasing in initial droplet size and increasing in salt solution concentration accelerate droplet evaporation. The prediction of the droplet properties near the heated plate is the goal of our work which is important to understand thin films deposition by spray pyrolysis process.

Keywords: ZnO thin films, Spray pyrolysis, $ZnCl_2$ aqueous solution, Droplet, Lifetime.

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