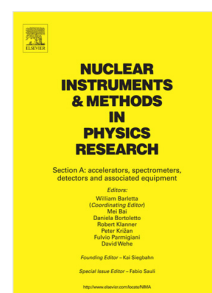


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Effect of annealing temperature on the photoluminescence and scintillation properties of ZnO nanorods

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Abstract

The effect of the annealing to enhance the photoluminescence (PL) and scintillation properties, as determined by pulse height distribution of alpha particle irradiation, has been investigated for solution grown ZnO nanorods. For this investigation the ZnO nanorod arrays were grown on glass for 22h at 95°C as a substrate using a solution based hydrothermal technique. The samples were first annealed for different times (30, 60, 90 and 120 min) at 300°C and then at different temperatures (100°C-600°C) in order to determine the optimum annealing time and temperature, respectively. Before annealing, the ZnO nanorod arrays showed a broad yellow-orange visible and near-band gap UV emission peaks. After annealing in a forming gas atmosphere, the intensity of the sub-band gap PL was significantly reduced and the near-band gap PL emission intensity correspondingly increased (especially at temperatures higher than 100°C). Based on the ratio of the peak intensity ratio before and after annealing, it was concluded that samples at 350°C for 90 min. resulted in the best near-band gap PL emission. Similarly, the analysis of the pulse height

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