

# Coexisting photoluminescence of Si and Ge nanocrystals in Ge/Si thin film

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# Outline

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1. Introduction
2. Experimental
3. Results and Discussion
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5. Future Works

# 1. Introduction

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- In recent years, low dimensional semiconductors, especially composites, have attracted much interest due to their photoluminescence especially visible photoluminescence at room temperature of nanometer-sized Si and Ge materials.
- In this article, we report PL investigations of the Ge/Si thin films prepared by using a variation of the pulsed laser deposition method.

## 2. Experimental

### Substrate preparation

Substrate :  $\text{Al}_2\text{O}_3$

A Nd:YAG pulsed laser beam of 355 nm wavelength 10 Hz pulse frequency. The laser pulse width was generally less than 10 ns and its power could reach 108 W

five different samples at 300, 400, 500 °C for 1 h, and at 500°C for 6 h in the air.

XRD

PL

### 3. Results and Discussion

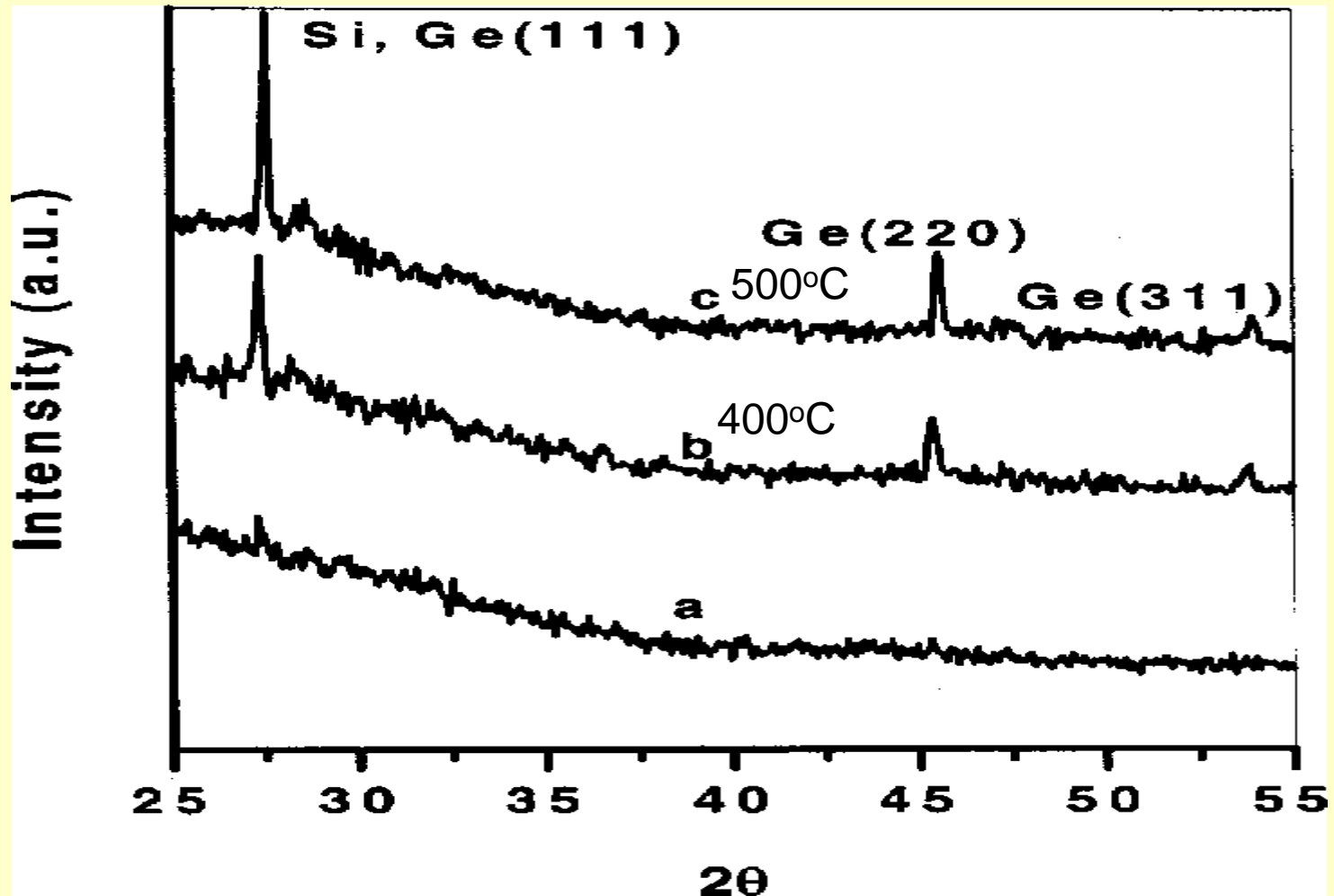


FIG. 1. Typical XRD results for the original sample (curve a), the sample annealed in the open but clean atmosphere at 400 °C for 1 h (curve b) and at 500 °C for 1 h (curve c).

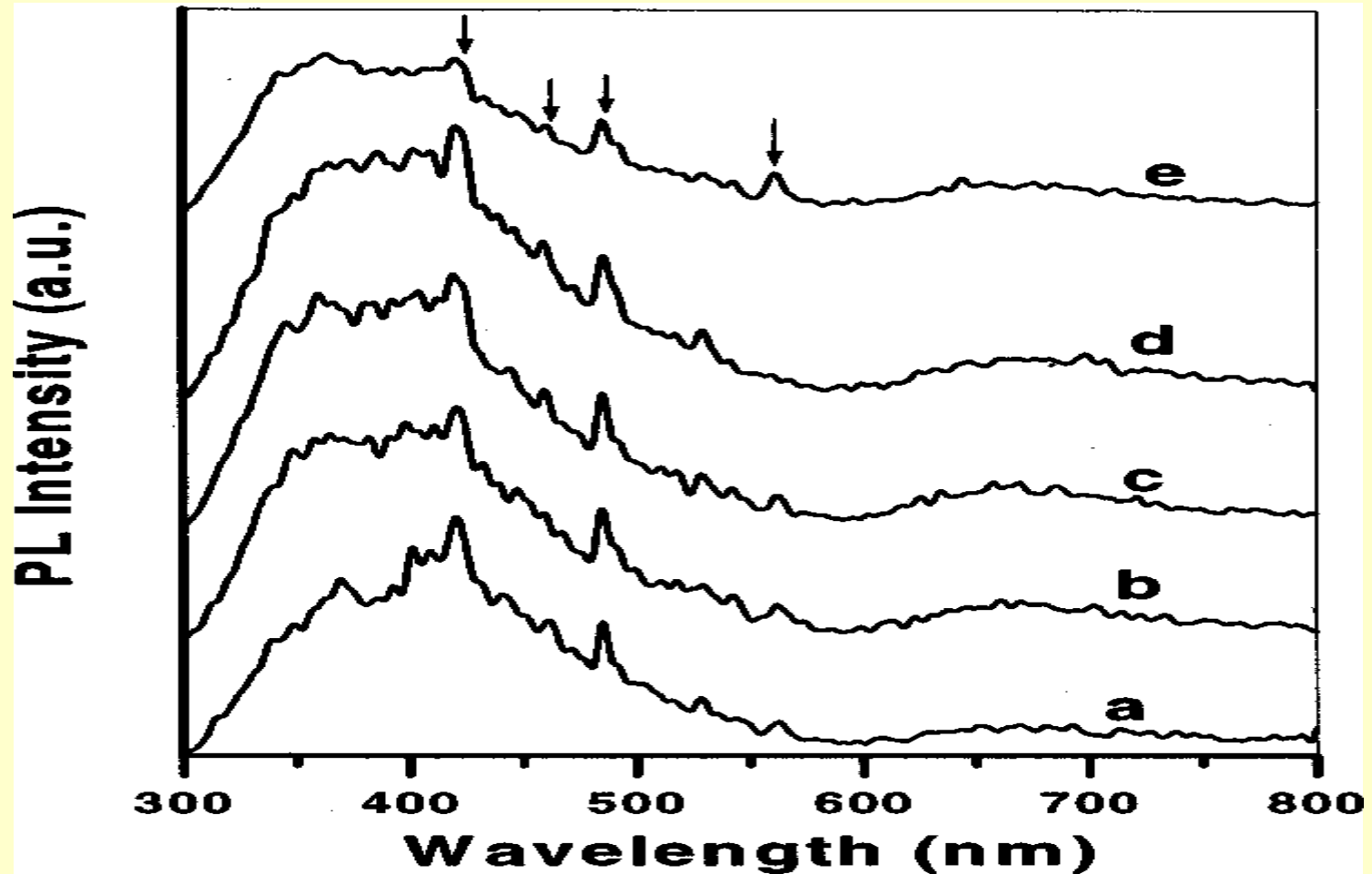


FIG. 2. PL results for all the samples with excitation light wavelength of 280 nm: (a) original as-prepared sample; (b) sample annealed at 300 °C for 1 h; (c) sample annealed at 400 °C; (d) sample annealed at 500 °C for 1 h; and (e) sample annealed at 500 °C for 6 h.

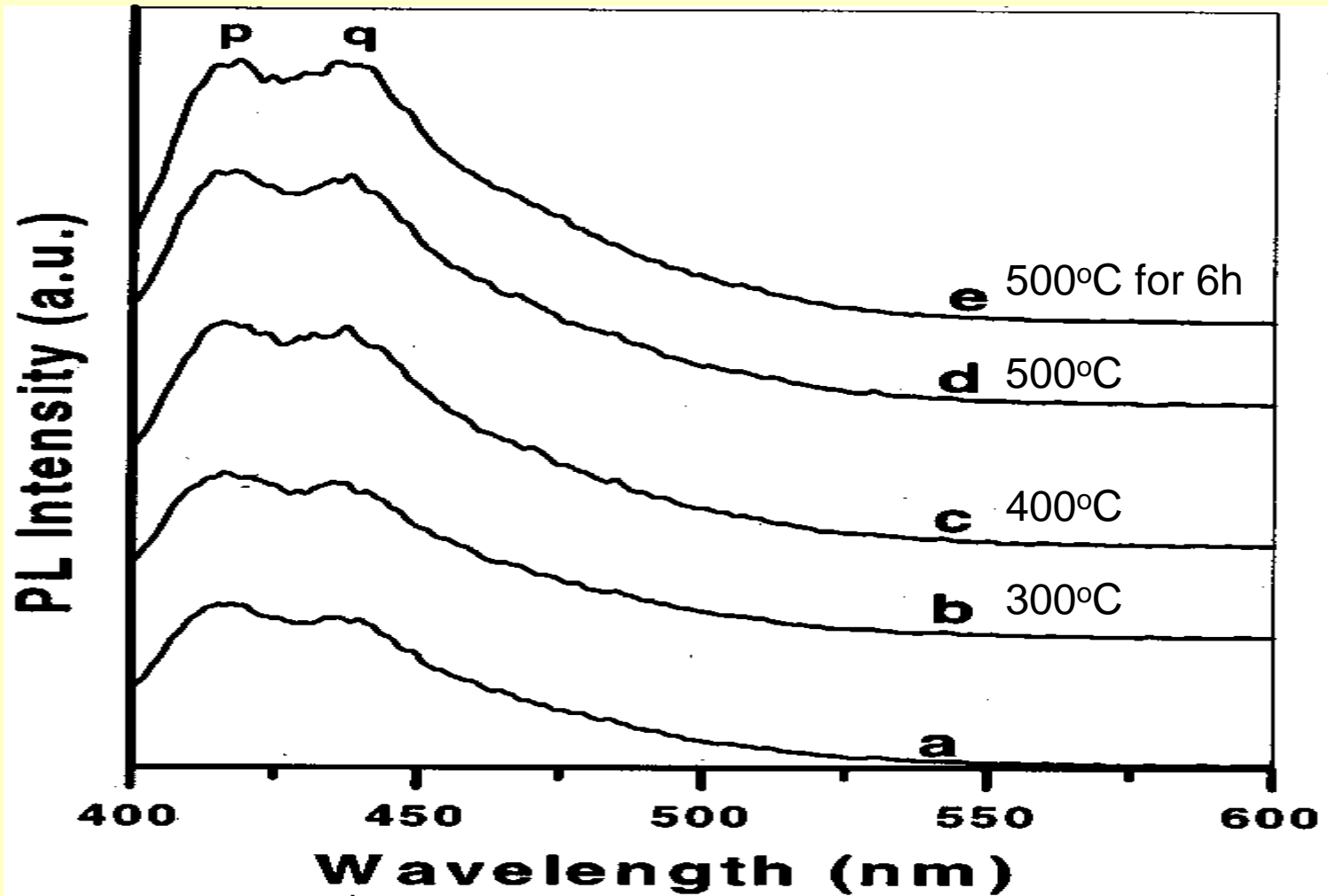


FIG. 3. PL results for the samples (a)–(e) as defined in Fig. 2 but with PL excitation light wavelength of 380 nm.

# 4. Conclusions

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1. We have prepared Ge/Si thin films by using a modified version of the PLD method.
2. The as-prepared films consisted of coexisting Si and Ge nanocrystals with most of the nanoparticles smaller than 10 nm in diameter.