



91 WYX!ghUH'fY'UI Uh'cb'jb'DVGY'ei Ubh a 'Xchg  
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*J. Chem. Phys.* **140**, 084701 (2014); 10.1063/1.4865832

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*Appl. Phys. Lett.* **93**, 191103 (2008); 10.1063/1.2909536

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*Appl. Phys. Lett.* **87**, 153113 (2005); 10.1063/1.2103399

Spectroscopy and carrier dynamics in CdSe self-assembled quantum dots embedded in Zn<sub>x</sub>Cd<sub>y</sub>Mg<sub>1-x-y</sub>Se

*Appl. Phys. Lett.* **87**, 253113 (2005); 10.1063/1.1947909

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*Appl. Phys. Lett.* **78**, 3320 (2001); 10.1063/1.1418035

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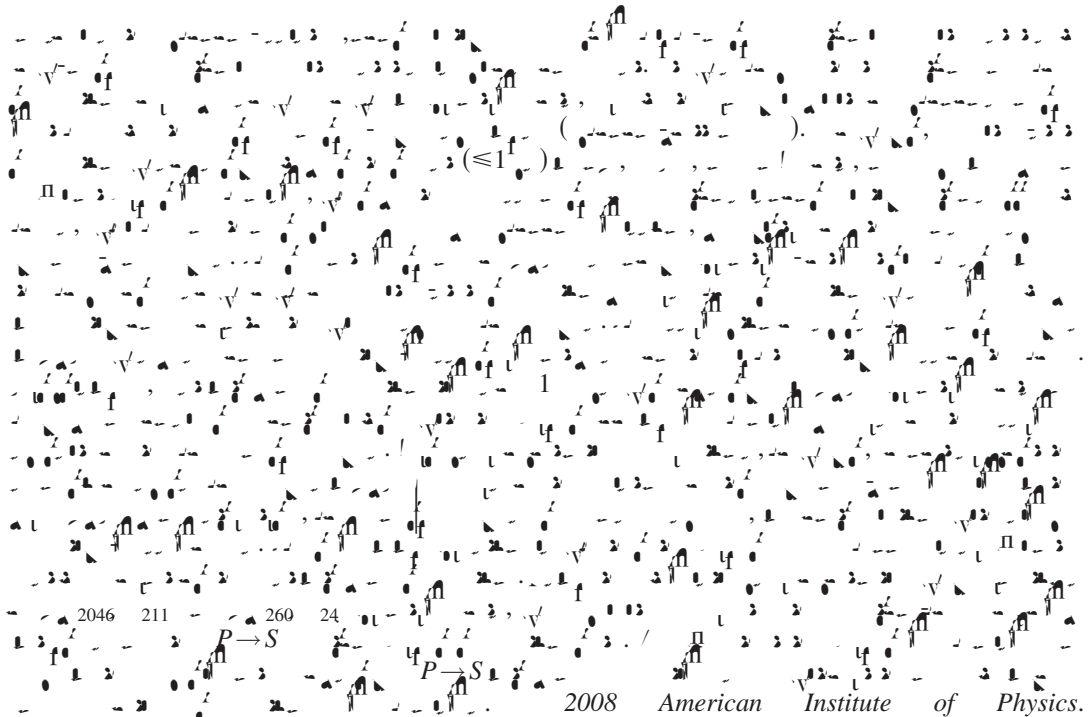
# Efficiency of the $\text{PbSe}$ laser diode

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## INTRODUCTION

The efficiency of a laser diode is determined by the ratio of the radiative recombination rate to the total recombination rate. In a direct bandgap semiconductor, the radiative recombination rate is high, but the total recombination rate is also high due to the presence of non-radiative recombination channels. The efficiency of a laser diode is therefore limited by the presence of non-radiative recombination channels. The efficiency of a laser diode is determined by the ratio of the radiative recombination rate to the total recombination rate. In a direct bandgap semiconductor, the radiative recombination rate is high, but the total recombination rate is also high due to the presence of non-radiative recombination channels. The efficiency of a laser diode is therefore limited by the presence of non-radiative recombination channels.

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$R$ ,

$$V(\mathbf{r}) = \sum_{\alpha} \sum_{\mathbf{R}} v_{\alpha}(|\mathbf{r} - \mathbf{R} - \mathbf{d}_{\alpha}|). \quad (4)$$

(4) *bulk*  
 $\sim 0.5$   
 $L$   
 $40$

$L$   
 $(R = 15.3)$   
 $2046$   $211$   $(R = 30.6)$   
 $10$   
 $(2)$

$$\epsilon^{-1}(\mathbf{r}_1, \mathbf{r}_2) = \epsilon^{-1}(\mathbf{r}_1, \mathbf{r}_2) + [\epsilon^{-1}(\mathbf{r}_1, \mathbf{r}_2) \epsilon^{-1}(\mathbf{r}_1, \mathbf{r}_2)] m(\mathbf{r}_1) m(\mathbf{r}_2), \quad (5)$$

$$m(\mathbf{r}) = \frac{1 - \exp(-|\mathbf{r}|/R)}{\sqrt{[\exp(\pi(R/|\mathbf{r}|)/2d) + 1]/2}}, \quad R < d < R+d,$$

$$\begin{aligned}
 & \text{... } e_p e_s \text{ ...} \\
 (\geq 130 \text{ ... } \sim \hbar \omega_{\text{...}})
 \end{aligned}$$

τ<sub>A</sub> E

SUMMARY

P → S 3.12.2  
20 35  
10  
P → S  
P → S

