## Lifetime and polarization of the radiative decay of excitons, biexcitons, and trions in CdSe nanocrystal quantum dots

, U ty Ld, LdLS29JT, UtdKd11M. <sup>2</sup>Nat a R wab E y Lab at y, G d , C ad 80401, USA  $(R \cdot () 5 M 2006; 2 + b + 30 O 2006; -1 M 2007)$   $(R \cdot () 5 M 2006; 2 + b + 30 O 2006; -1 M 2007)$   $(R \cdot () 7 + 642.4554T92 8.4554 - -7291.9 + 2 S 7E -3 2 .8 -39)$ 

 $(X): (XX) \sim 1:1$  (*R*=19.2 ). T 

7, -

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#### I. INTRODUCTION

# $(XX) \qquad \qquad (X^+ \qquad X \ ).$

### II. METHOD

	R = 10.	3, 14	.6,		CS 9.2, . <sup>7</sup> T	'	7 - '			-
	,	,			,	,		R	8	, 9.
Т	,	(1.5	• >				,		-	-
LDA		(LD	A)	'				'.	Т	-
	S			,			,	T	-	
	,		()		-		'	. T		-
,	,	S			(-)	v,c		,		
	-		,		( <i>c</i> )					

$$\left(\frac{1}{c}\right)_{,} = \frac{4}{3c^{2}} \frac{F^{3}}{c^{2}} |\boldsymbol{M}_{,}|^{2},$$
 (2)

 $( , = {}^{2} , F=3 /(_{NQD}+2 ) , NQD ), \\ c , -460.8 -460.8 -4 6460.8 T 6460 -60.110 T 6460 -60.110 08302655.14.0132T T /F21T$ 

$$f^{\text{SP}}$$
  $f^{\text{SP+C}}$  (LMT 1)

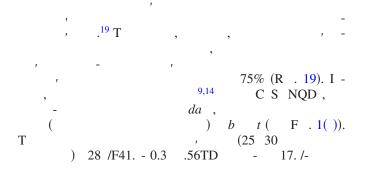
$$(E^{(GV(C))})$$
SP (LMT 1)

$$^{(SP+C)} = \left(\frac{1}{E^{(SP+C)}}\right) \quad ^{(SP)}, \tag{5}$$

$$(SP+C)$$
  $\left( \begin{array}{c} E^{(SP)} \end{array} \right)^3$   $(SP)$   $(5)$ 

z a [F . 4( )]. T '

$[N_V=3$	$N_C = 1$	E . (1)]	
	΄,		12
,	<i>X</i> . T		



,19 83TD62095414001 9T 0001 0.50010TD,T 001 0.250TD0.0001T 14T 9.9701 0.5011T 0.00014T001 0.250TD0.000

### F. Trions

Ι	,				
F . 1()]	, . T ,	$ \begin{array}{c} & X^{+} [N=3] \\ & \begin{pmatrix} 1 & 2\\ 1 & 1 & 3 \end{pmatrix}, \end{array} $			
$\begin{pmatrix} 1 & 1 & 1 \\ 1 & 1 & 2 \end{pmatrix}$ . R	$\begin{pmatrix} 1 & 1 & 1 \\ 1 & 1 & 4 \end{pmatrix},$ N=1,,	$X^+ (N=3)$			
$\begin{array}{ccc} T & & - \\ F & . 1()] \\ ( \begin{array}{c} 2 & 1 \\ 1 & 2 \end{array}). T \end{array}$	·····, · ·,	$\begin{array}{ccc} X & [N=3 \\ & \begin{pmatrix} 2 & 1 \\ 1 & 1 \end{pmatrix} 284 \ 0 \\ & \begin{pmatrix} 2 & 1 \\ 1 & 3 \end{pmatrix} \end{bmatrix}$	924.919 0 TD.0.984 0 0 .984T.	-t m. at 84T. TI	Da T 9.T.T 1