ADVANCED MATERIALS

**Supporting Information**

for

*Advanced Materials*, adma.200400772

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**Supplementary Figure^^S1.** Excitation and absorption spectra of 1^^wt.-% colloidal solutions of $NaYF_4$:20^%$Yb^{3+}$,2^%$Er^{3+}$ nanocrystals in DMSO in the region of the $Yb^{3+}$ $^2F_{7/2}$^<?pla>^$^2F_{5/2}$ region in the NIR. The upper part shows the upconversion excitation spectrum monitoring the green upconversion luminescence at 18^519^^$cm^{<M->1}$ (540^^nm). The lower part shows the absorption spectrum.

**Supplementary Figure^^S2.** Dependence of the green (<MO>, $Er^{3+}$ $^4S_{3/2}$, $^2H_{11/2}$^<?Pla>^$^4_{15/2}$) and near infrared (<Mq>, $Yb^{3+}$ $^2F_{5/2}$^<?Pla>^$^2F_{7/2}$ and $Er^{3+}$ $^4I_{11/2}$^<?Pla>^$^4_{15/2}$) luminescence intensities of the colloidal $NaYF_4$:20^%$Yb^{3+}$,2^%$Er^{3+}$ solution on the excitation power density in double logarithmic representation. The data are arbitrarily shifted along the y axis for better visualisation. The solid lines are least-squares fits to the data at low power densities with slopes of 1.9^<M+->^^0.1 and 0.9^<M+->^0.1 for the green and NIR emission intensities, respectively. The slopes indicate the order of the optical process. At high power densities the power dependences level off as a result of saturation effects also observed in bulk materials.

**Supplementary Figure^^S3.** Dependence of the violet (<Mo>, $Tm^{3+}$ $^1D_2$^<?Pla>^$^3H_6$), blue (<?rv>, $Tm^{3+}$ $^1G_4$^<?Pla>^$^3H_5$) and near infrared (<Mq>, $Yb^{3+}$ $^2F_{5/2}$^<?Pla>^$^2F_{7/2}$) luminescence intensities of the colloidal $NaYF_4$:20^%$Yb^{3+}$,2^%$Tm^{3+}$ sample on the excitation power in double logarithmic representation. The data are arbitrarily shiftet along the y axis for better visualisation. The solid lines are least-squares fits to the data at low power densities with slopes of 3.7^<M+->^0.1, 2.8^<M+->^0.1 and 0.9^<M+->^0.1 for the violet, blue and NIR emission intensities, respectively. The slopes indicate the order of the optical process. At high power densities the power dependences level off as a result of saturation effects also observed in bulk materials.

# Supplementary material (3 figures)

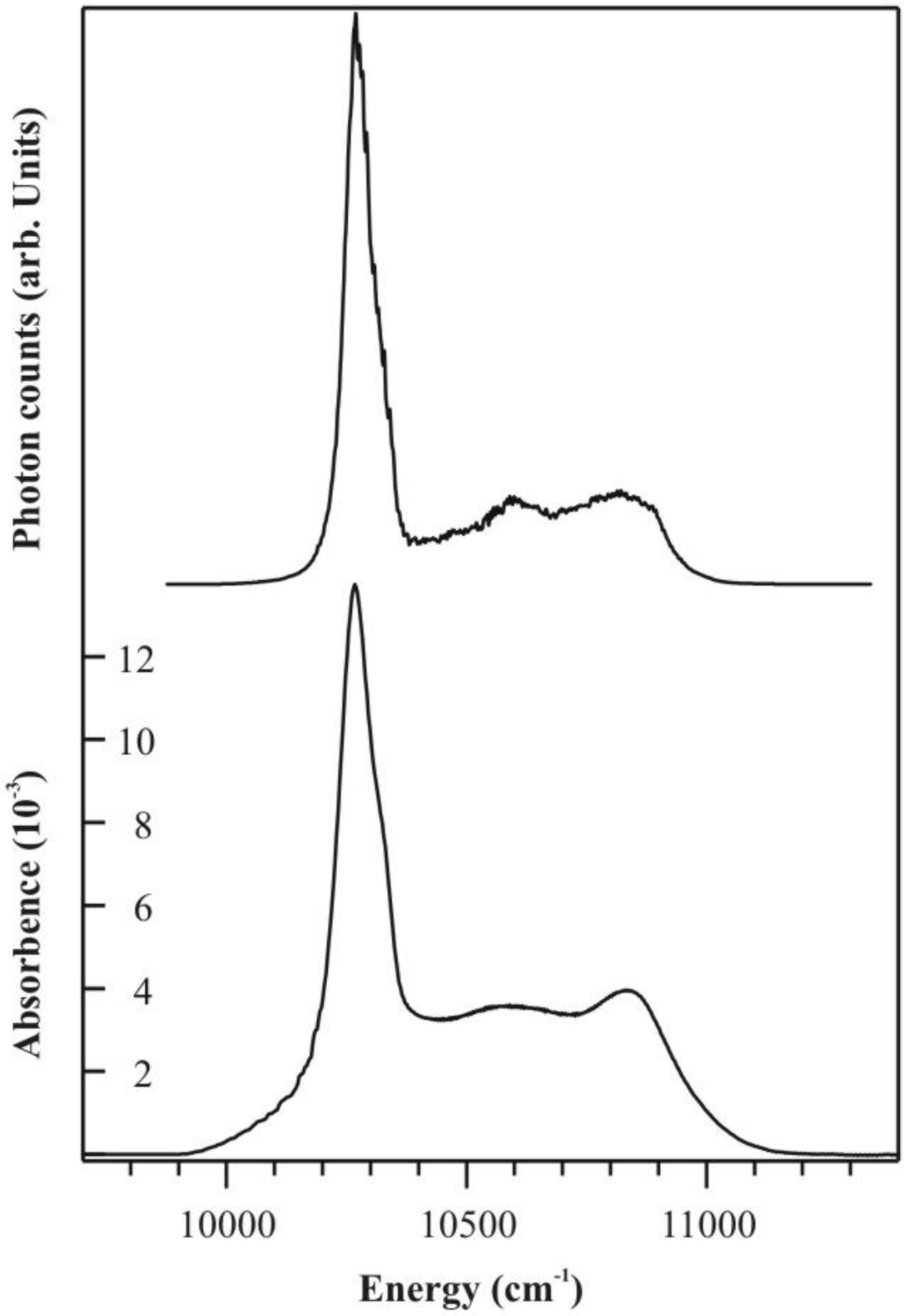
Photon counts (arb. Units)
Absorbence ($10^{-3}$)
12
10
8
6
4
2
10000
10500
11000
Energy ($cm^{-1}$)

*Fig. S1*

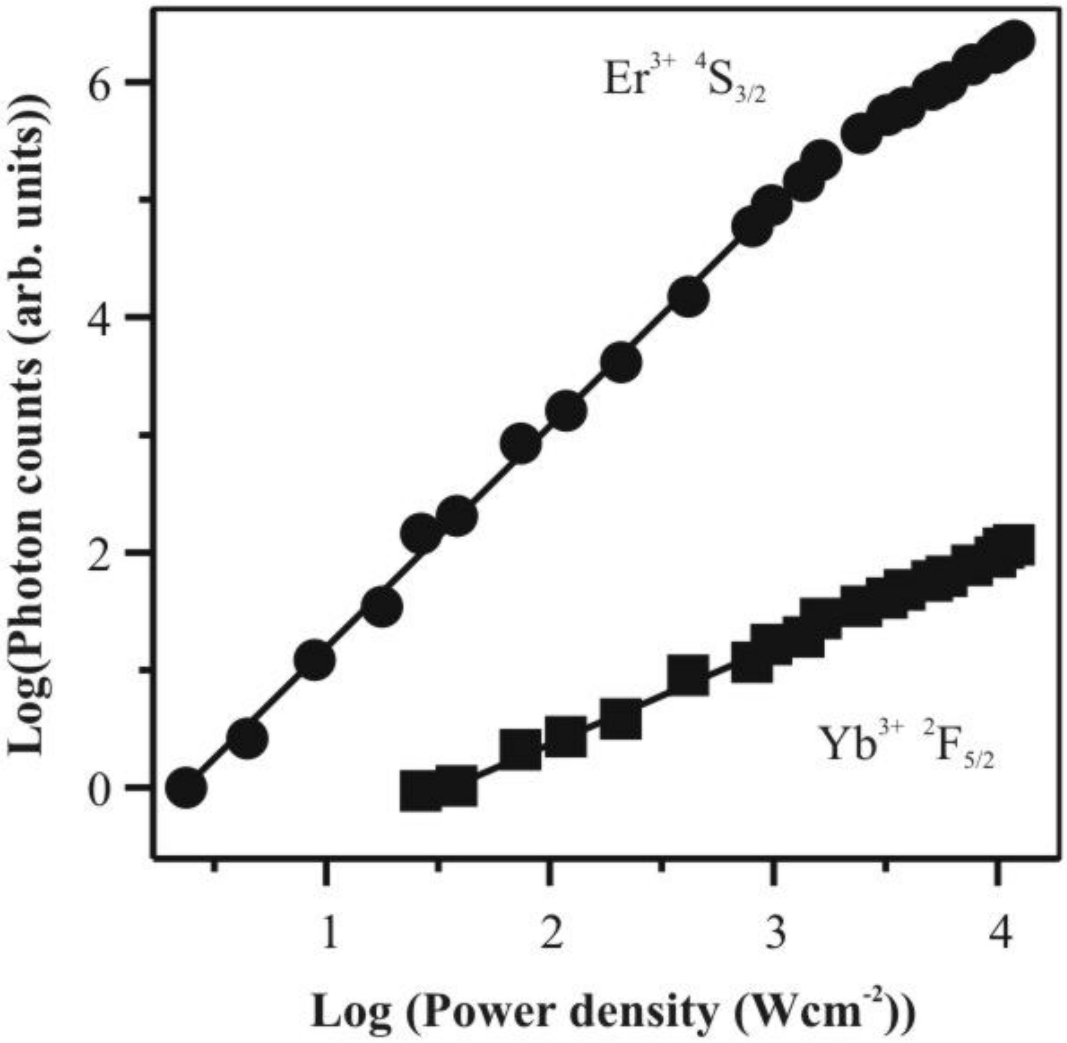
Er3+ 4S3/2
Yb3+ 2F5/2
Log(Photon counts (arb. units))
Log (Power density (Wcm-2))
0
2
4
6
1
2
3
4

*Fig. S2*

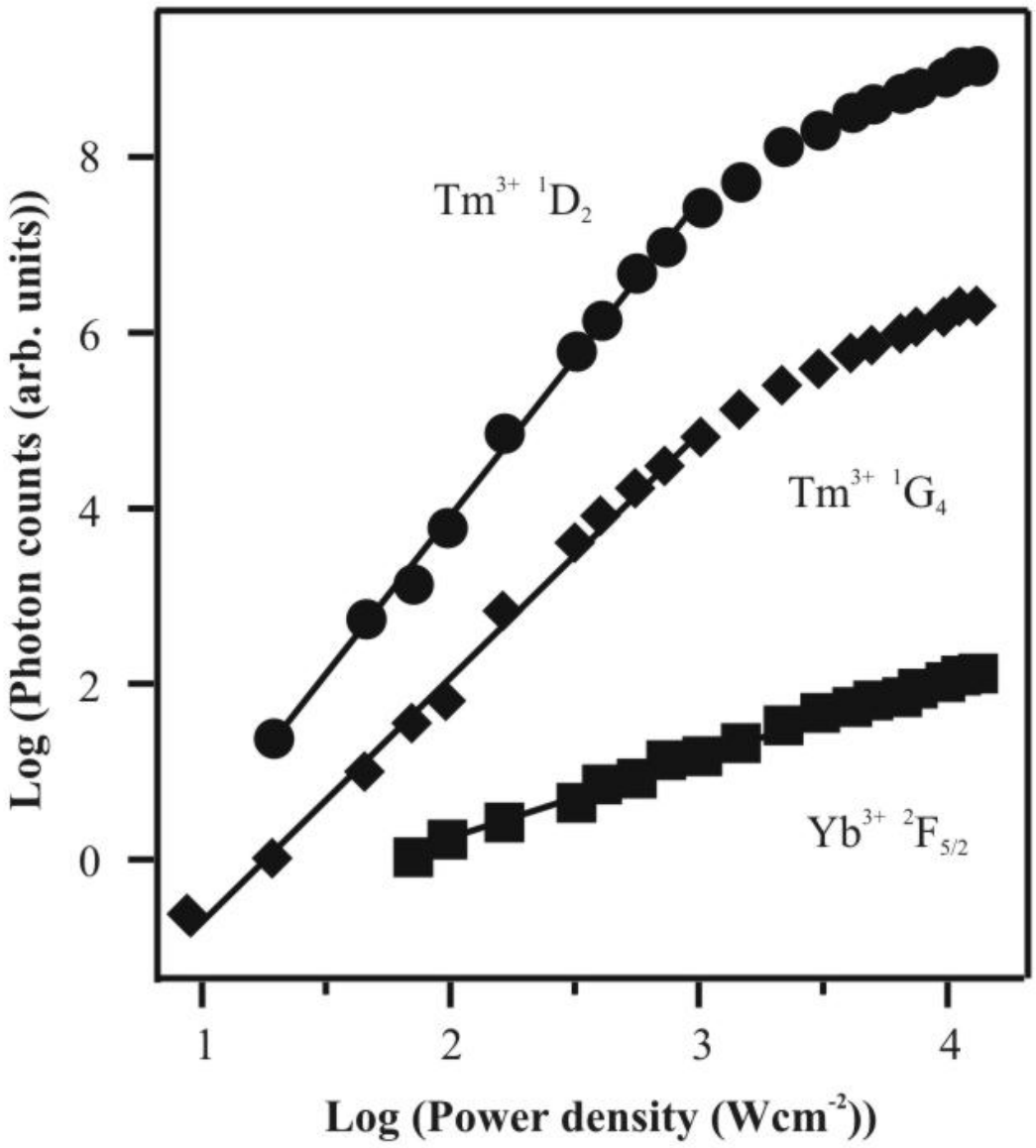
Log (Photon counts (arb. units))
Log (Power density (Wcm-2))
Tm3+ 1D2
Tm3+ 1G4
Yb3+ 2F5/2
0
2
4
6
8
1
2
3
4

Fig S3