Supporting Information

Transition Metal Ion-Based Nanocrystalline Luminescent Thermometry in $SrTiO_3:Ni^{2+}$, Er^{3+} Nanocrystals Operating in the Second Optical Window of Biological Tissue

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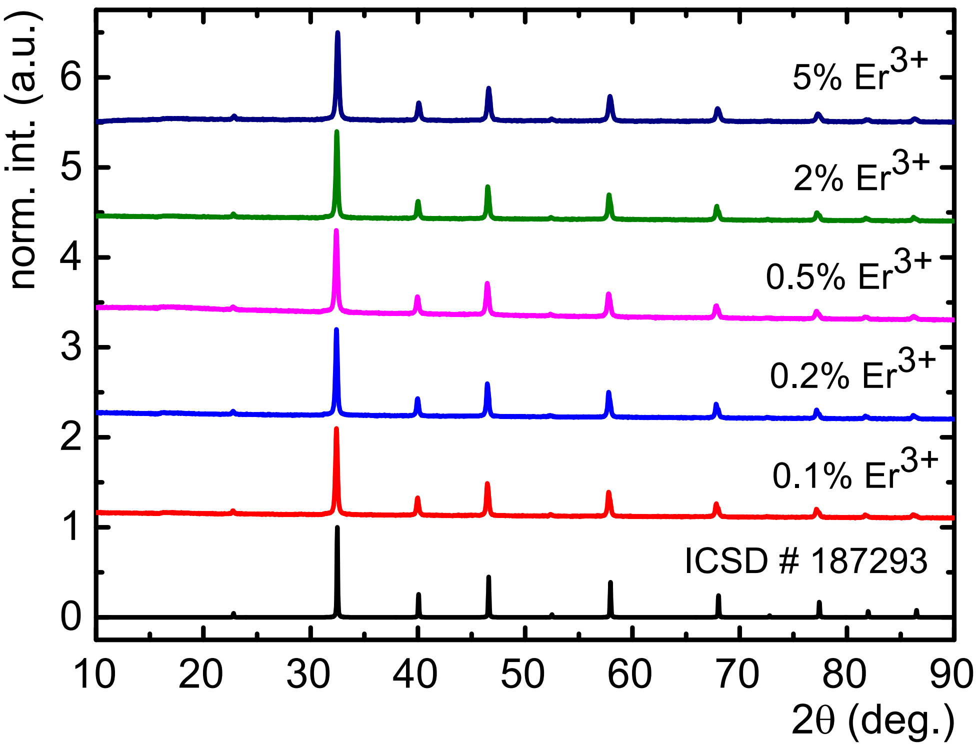

Figure S1. X – ray diffraction patterns of $SrTiO_3:Ni^{2+}$, Er^{3+} nanocrystals for different Er^{3+} ions concentration.

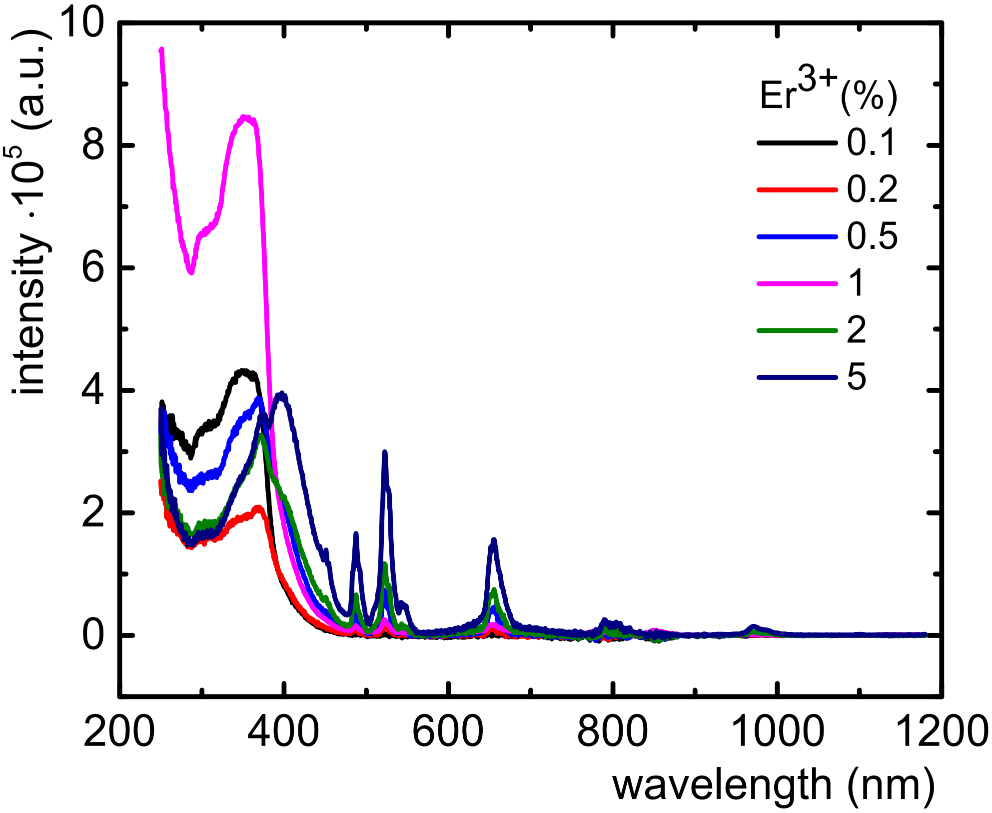

Figure S2. Excitation spectra of $SrTiO_3:Ni^{2+}$, Er^{3+} nanocrystals for different Er^{3+} ions concentration measured at λ_{em}=1545nm.

Activation energy calculations

We obtained the value of activation energy from the equation:

$$I_{em} = \frac{I_0}{1 + \exp(-\frac{\Delta E_a}{kT})}$$

Where: *I_0 – maximum emission intensity*

I_{em} – emission intensity obtained from measurements

ΔE_a – activation energy

k – Boltzmann constant

T – temperature [K]

The integral emission intensity obtained from measurements was converted to the form of $ln(I_0/I_{em} - 1)$ and presented in the function of $1/T$. Subsequently, the declining part of this characteristic was approximated by a linear function $y = ax + b$, where slope a equaled $\Delta E_a/k$.

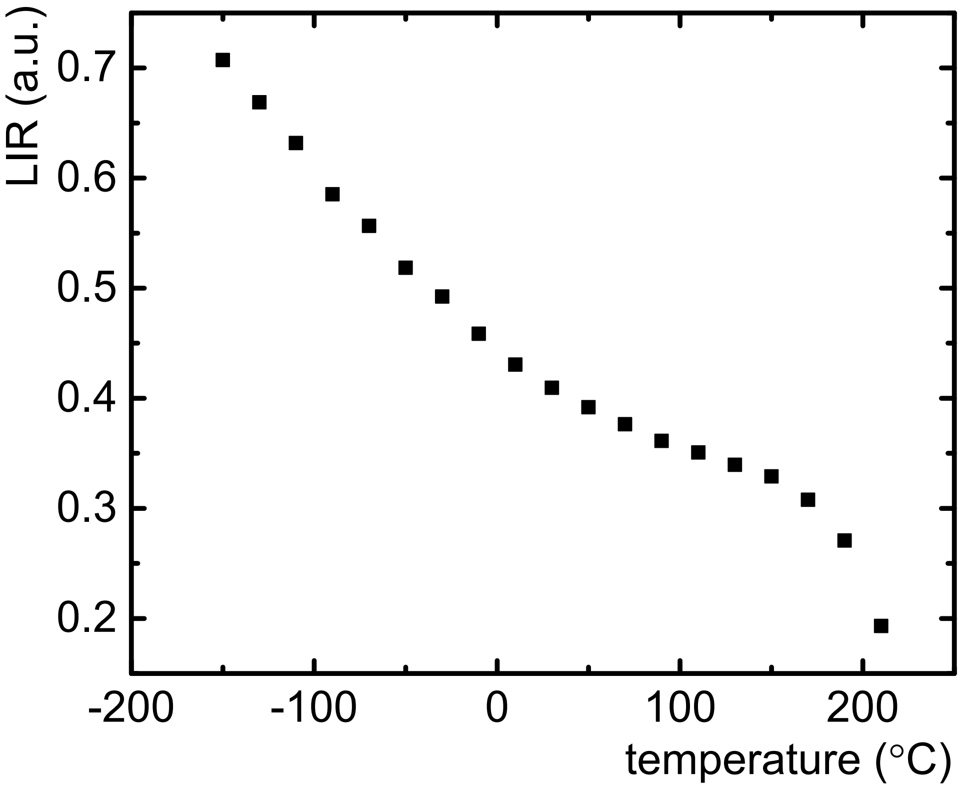

Figure S3. LIR as a function of temperature for $SrTiO_3$: 0.1% Ni^{2+}, where LIR was defined as:

$$LIR = \frac{\int I(1100 - 1250nm)}{\int (1250 - 1400nm)}$$

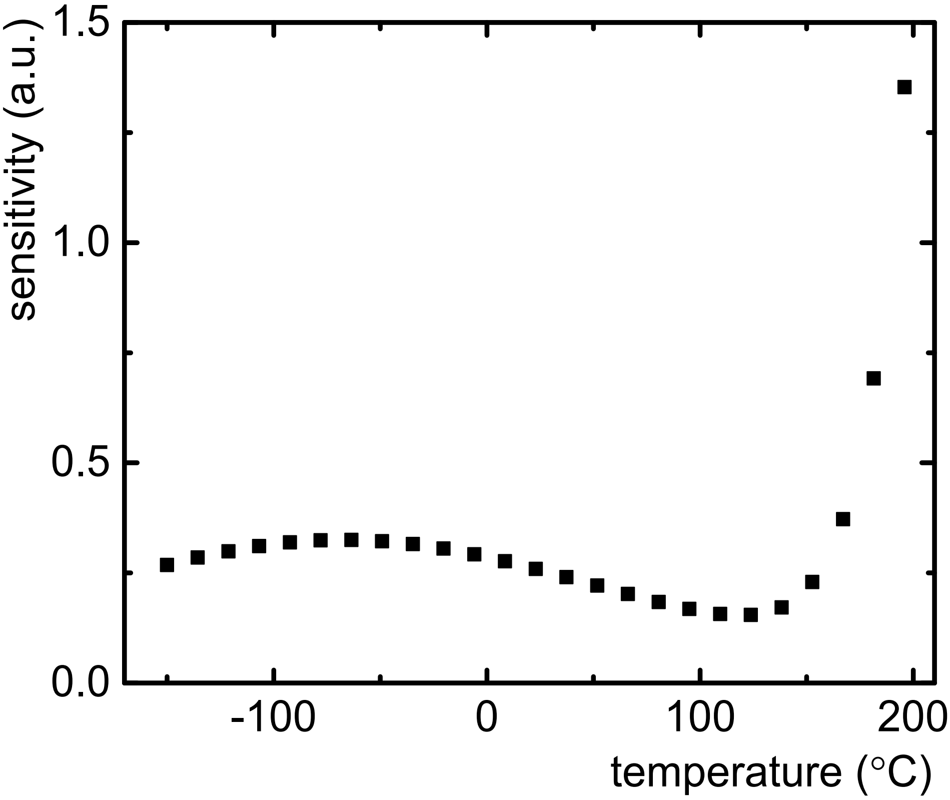

Figure S4. Relative sensitivity as a function of temperature for $SrTiO_3$: 0.1% Ni^{2+}, where LIR was defined as:

$$LIR = \frac{\int I(1100 - 1250nm)}{\int (1250 - 1400nm)}$$

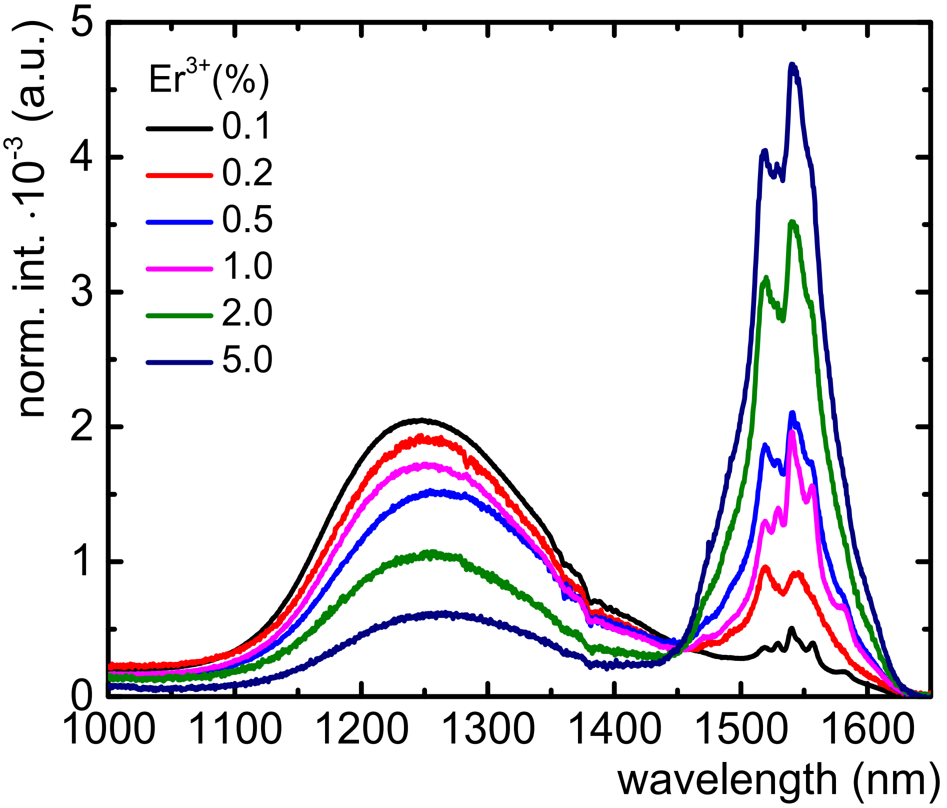

Figure S5. Emission spectra of $SrTiO_3$:Ni^{2+}, Er^{3+} nanocrystals for different Er^{3+} ions concentration upon λexc=375nm, normalized to the total integral intensity of both emission bands.

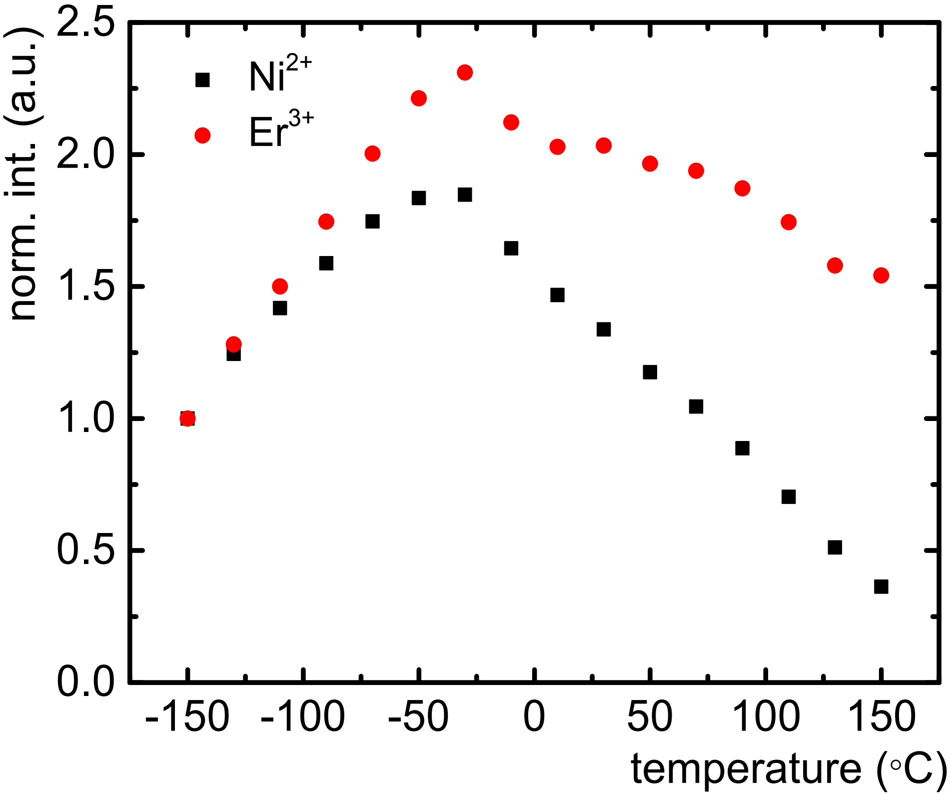

Figure S6. Comparison of integral intensity of Ni^{2+} ions and Er^{3+} ions for $SrTiO_3$: 0.05% Ni^{2+}, 0.1% Er^{3+}, normalized to the first value.

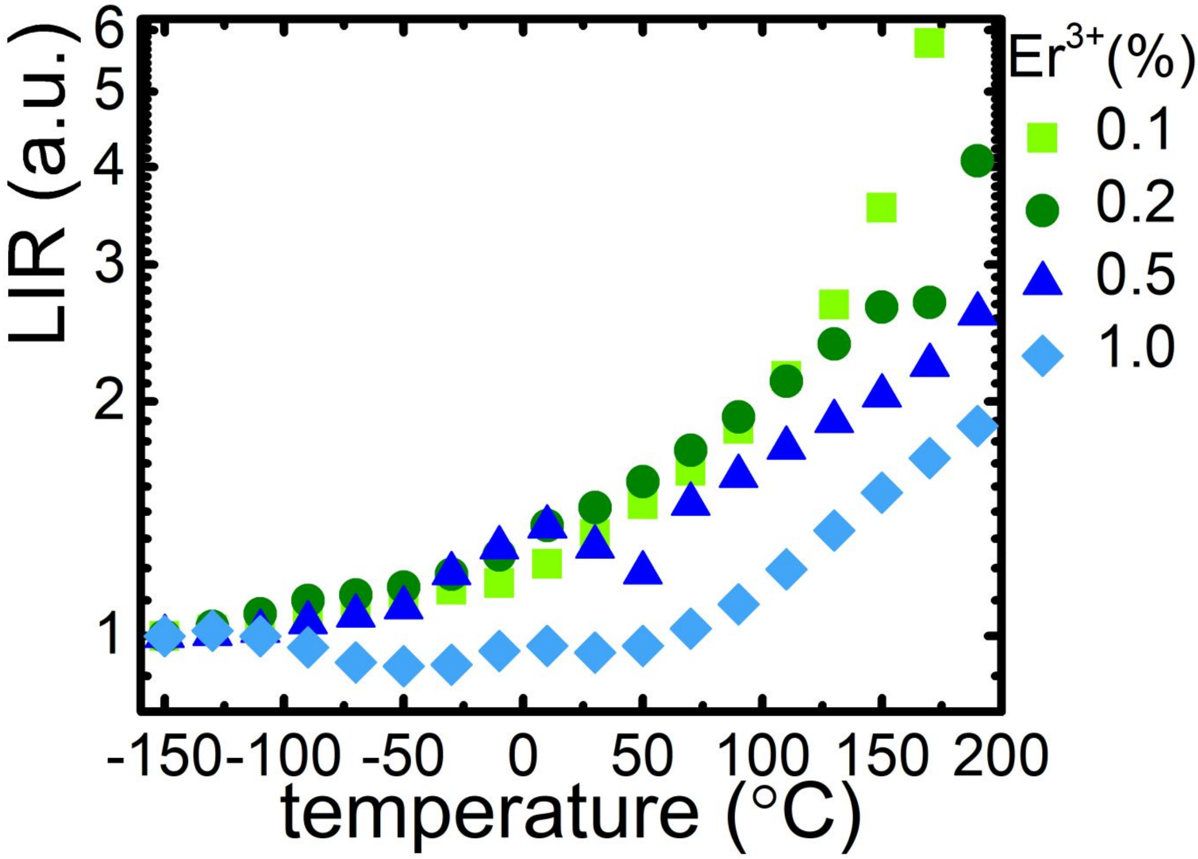

Figure S7. Normalized integral intensity of $SrTiO_3$: 0.05%Ni^{2+}, Er^{3+} for different Er^{3+} ions concentration calculated for the whole Ni^{2+} emission band.

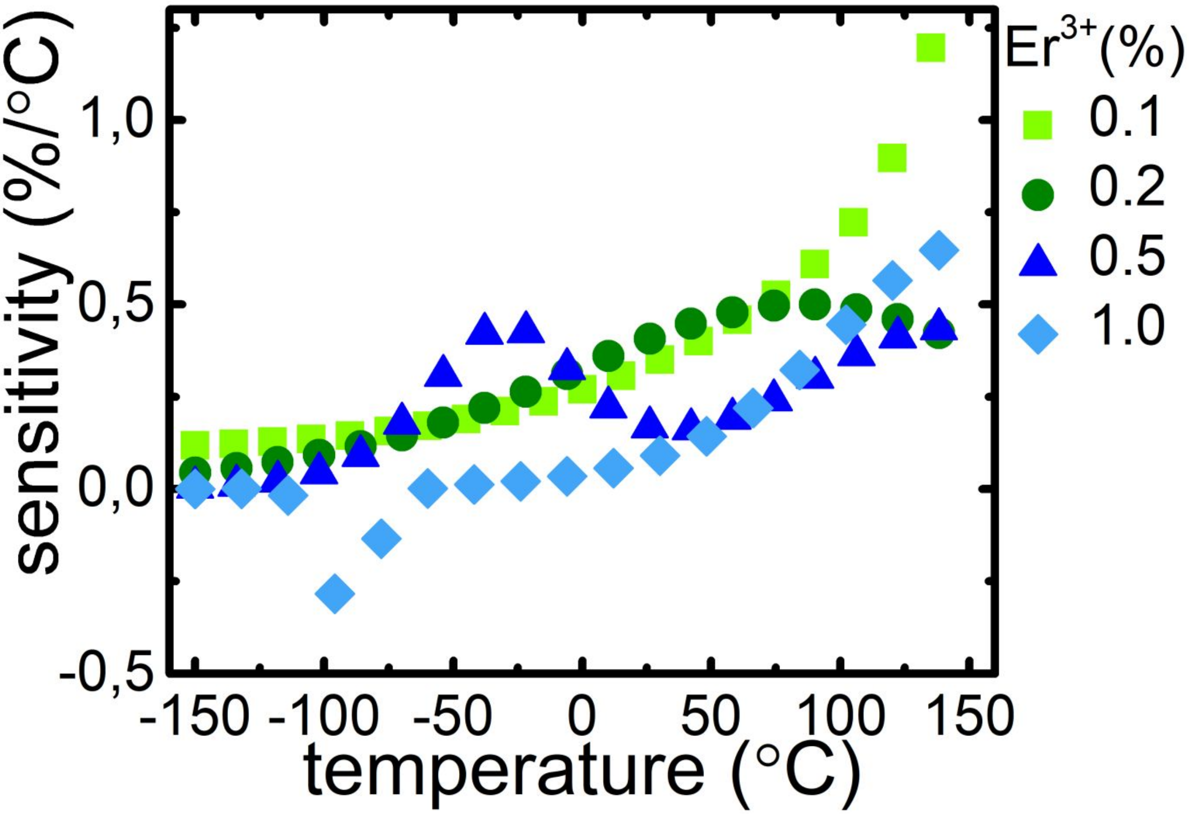

Figure S8. Relative sensitivity of $SrTiO_3$: 0.05%Ni^{2+}, Er^{3+} for different Er^{3+} ions concentration calculated for the whole Ni^{2+} emission band.