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Supporting Information

Highly sensitive lifetime-based luminescent manometer and bi-functional pressure-temperature sensor based on a spectral shift of the R-line of Mn^{4+} in $K_2Ge_4O_9$

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KEYWORDS luminescent manometer, pressure sensor, Mn^{4+}, average lifetime, luminescence intensity ratio, manometry

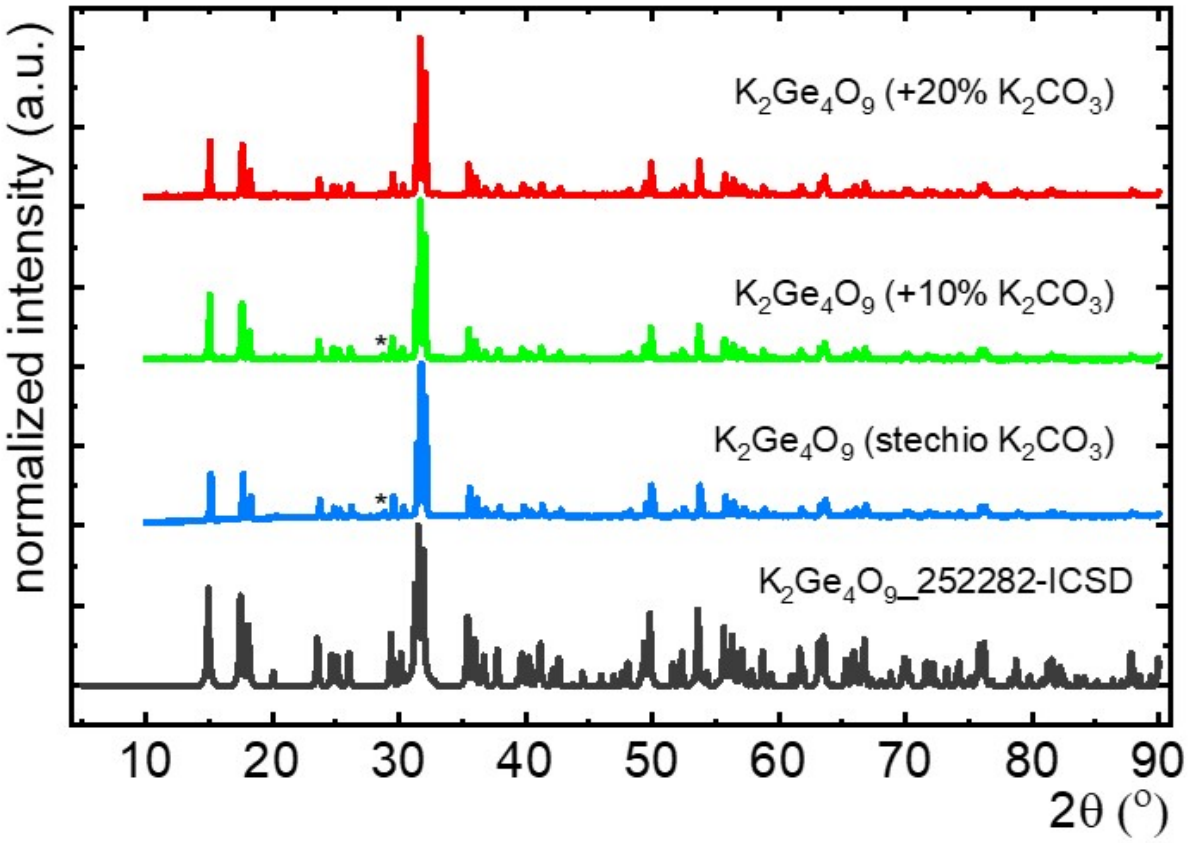

Figure S1. XRD patterns of $K_2Ge_4O_9$ synthesized with different molar amount of K_2CO_3.

Table S1. Rietveld refinement parameters for $K_2Ge_4O_9$:Mn^{4+} calculated for different Mn^{4+} concentration

Sample	a [Å]	b [Å]	c [Å]	R expected	weighted R profile	weighted R profile
$K_2Ge_4O_9$:0.1%Mn^{4+}	11.84172	11.84172	9.79338	2.2167	4.8745	3.99871
$K_2Ge_4O_9$:0.2%Mn^{4+}	11.84089	11.84089	9.79345	2.0271	5.2714	4.01230
$K_2Ge_4O_9$:0.5%Mn^{4+}	11.83931	11.83931	9.79292	1.9945	4.7332	3.97433
$K_2Ge_4O_9$:1%Mn^{4+}	11.83718	11.83718	9.79252	2.0713	4.9912	3.96217
$K_2Ge_4O_9$:2%Mn^{4+}	11.83196	11.83196	9.79025	1.9722	6.01227	5.01201

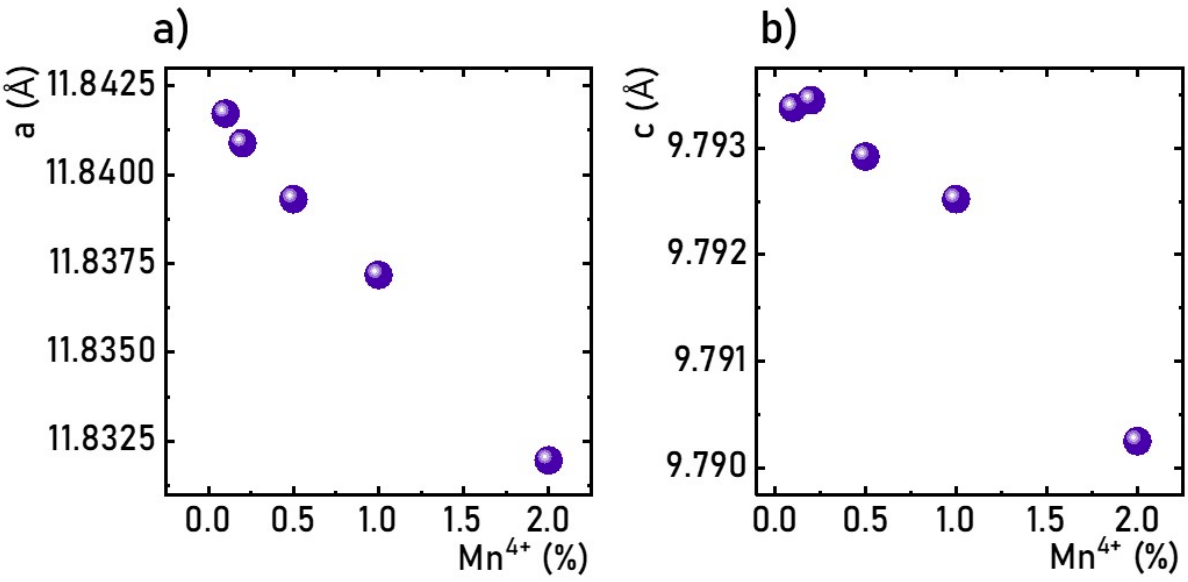

Figure S2. The unit cell parameter of $K_2Ge_4O_9$ structure calculated for different Mn^{4+} concentration.

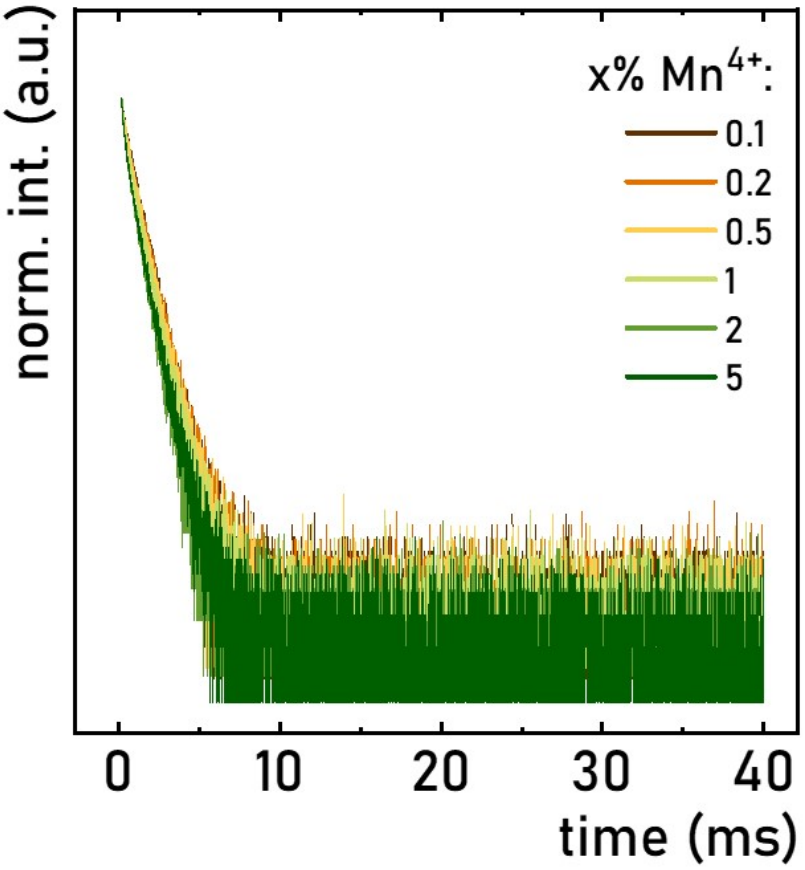

Figure S3. Luminescence decay curve form ^2E state of Mn^{4+} in $K_2Ge_4O_9$:Mn^{4+} measured at 83K for different concentration of Mn^{4+} ions.

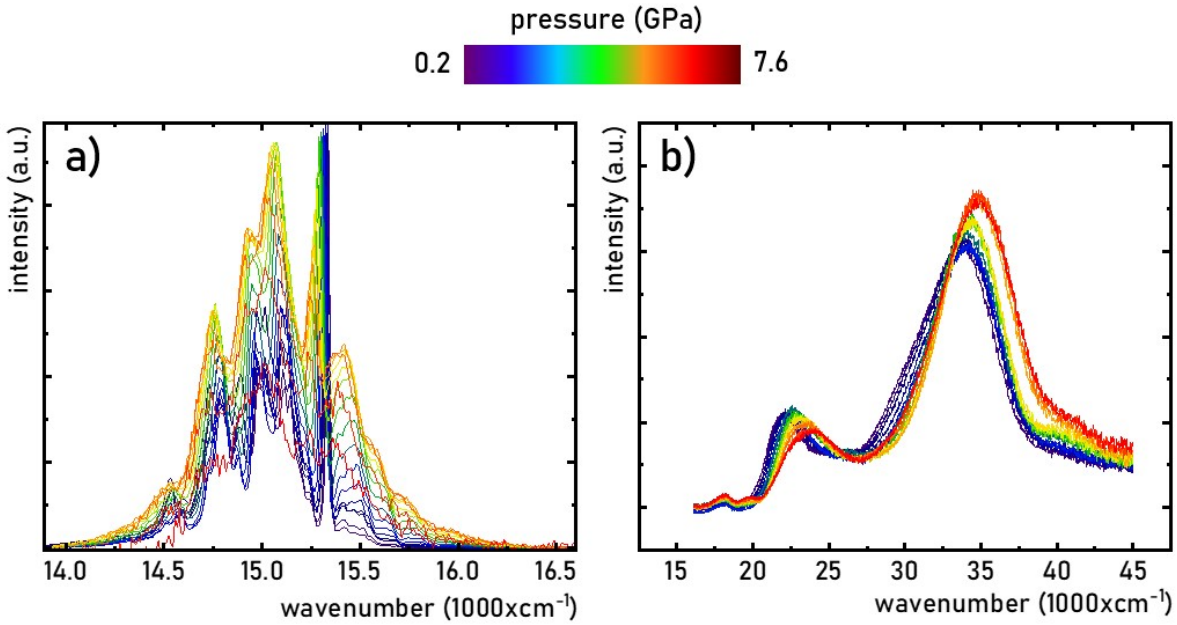

Figure S4. Pressure dependence of emission -a) and excitation -b) spectra of $K_2Ge_4O_9:Mn^{4+}$.

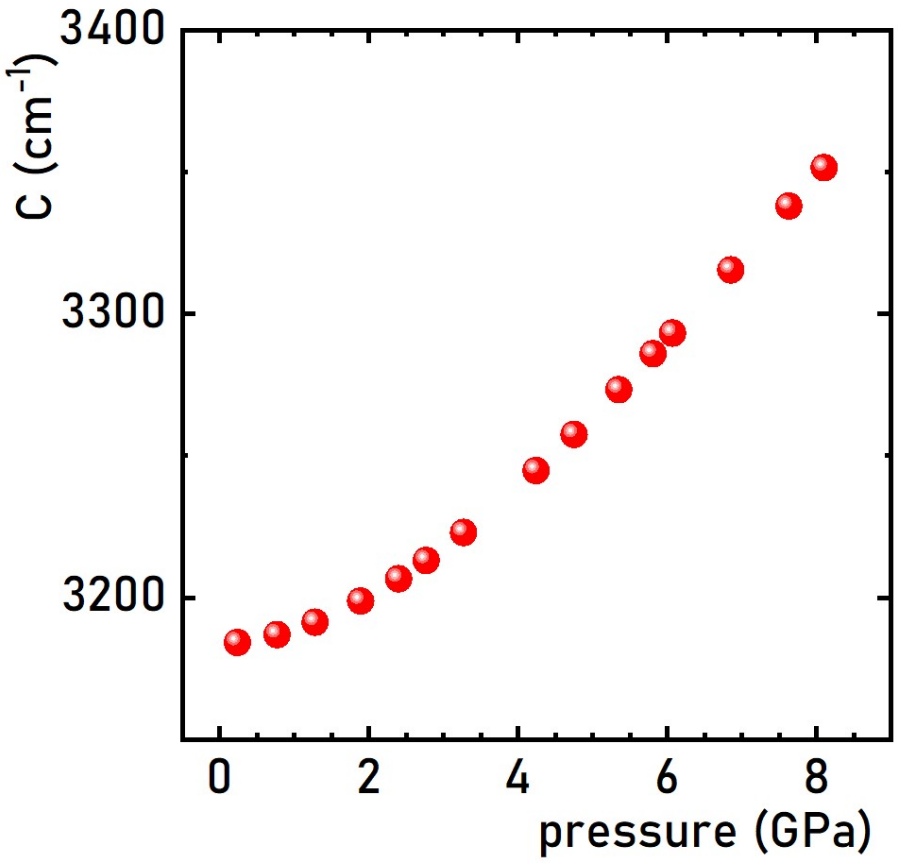

Figure S5. Pressure dependence of C parameter determined based for $K_2Ge_4O_9:Mn^{4+}$ on the excitation spectra analysis.