

## Supporting information

# Phase-formations of $\text{Mg}_2\text{P}_2\text{O}_7$ - $\text{Mn}_2\text{P}_2\text{O}_7$ mixed pyrophosphates and its desired luminescence abilities

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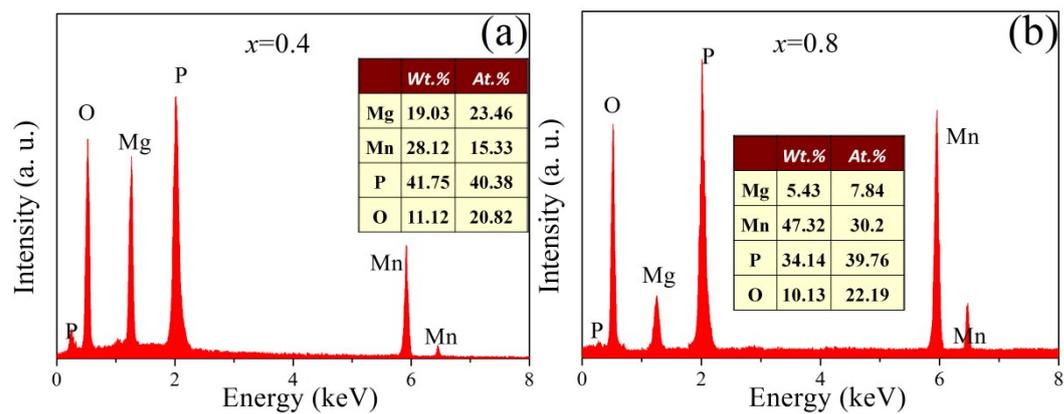
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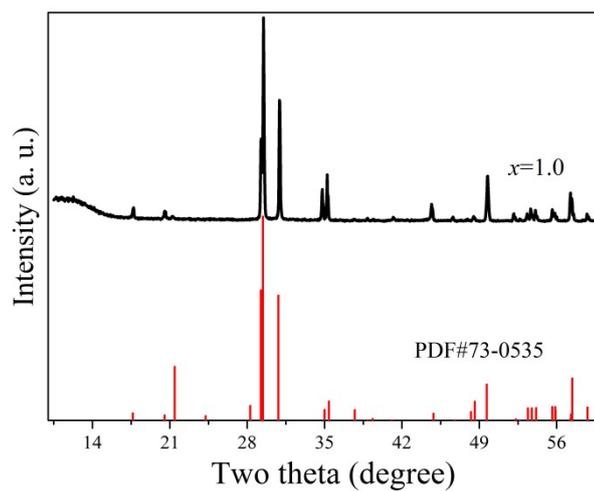
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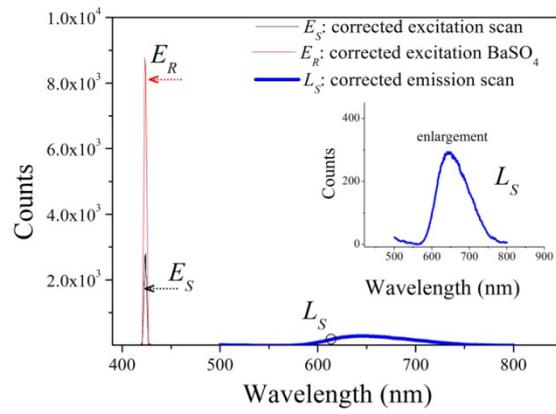
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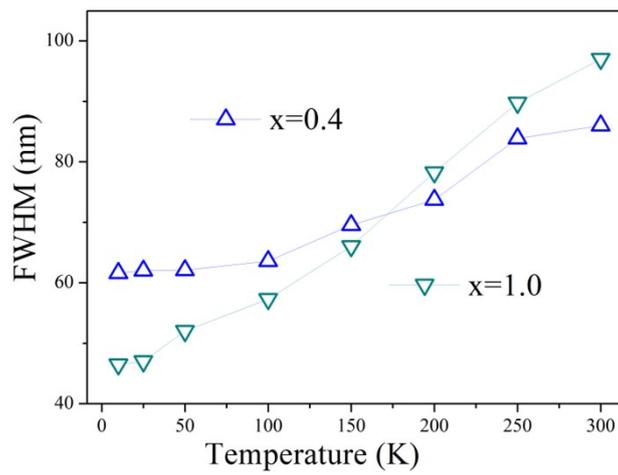
**Figure-S-1** the EDS measurements of  $(\text{Mg}_{1-x}\text{Mn}_x)_2\text{P}_2\text{O}_7$  with  $x=0.4$  (a) and  $x=0.8$  (b).



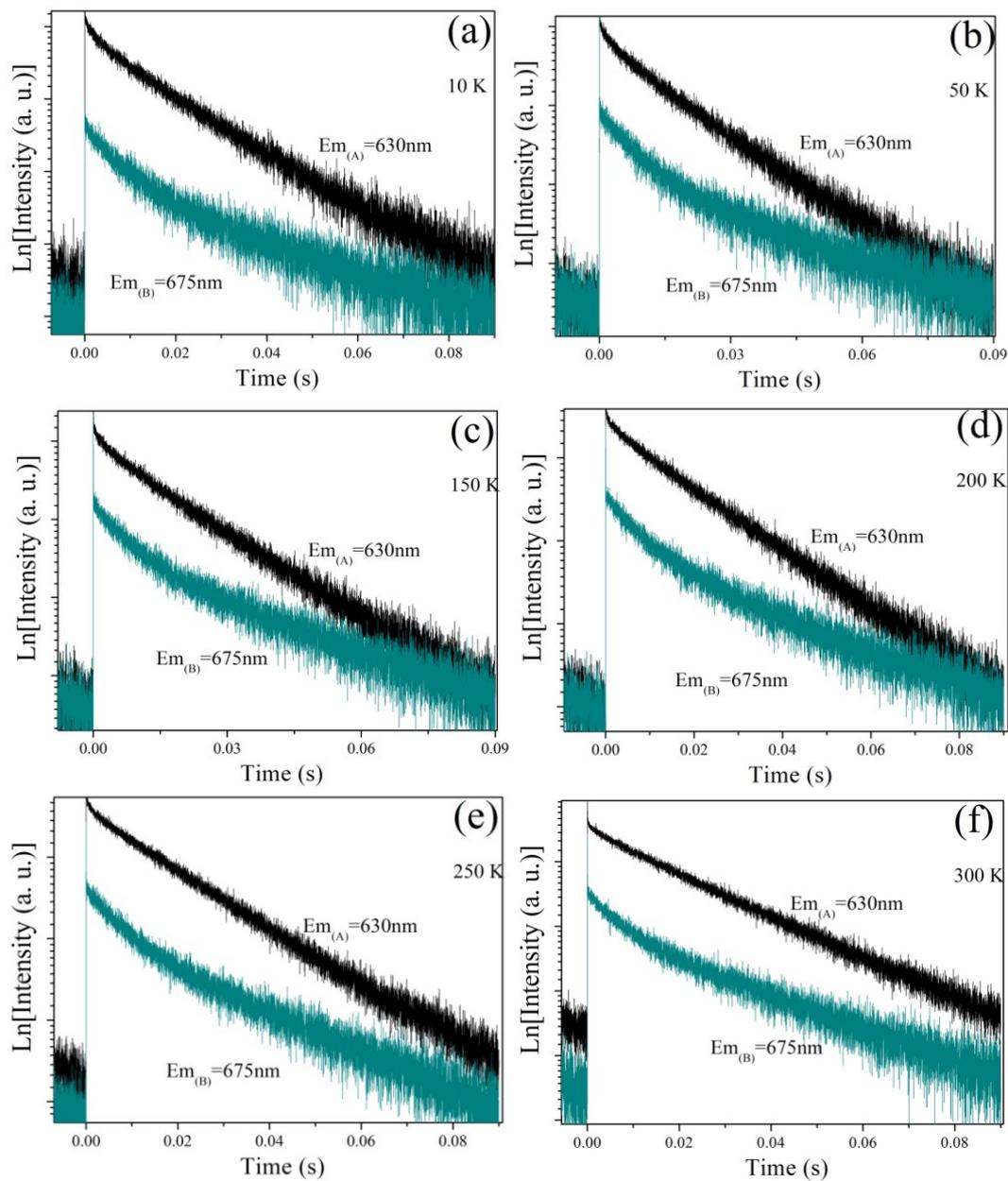
**Figure-S-2** XRD pattern of  $(\text{Mg}_{1-x}\text{Mn}_x)_2\text{P}_2\text{O}_7$  ( $x=1.0$ ) and the standard card PDF# No: 73-0535 ( $\beta\text{-Mg}_2\text{P}_2\text{O}_7$ ).



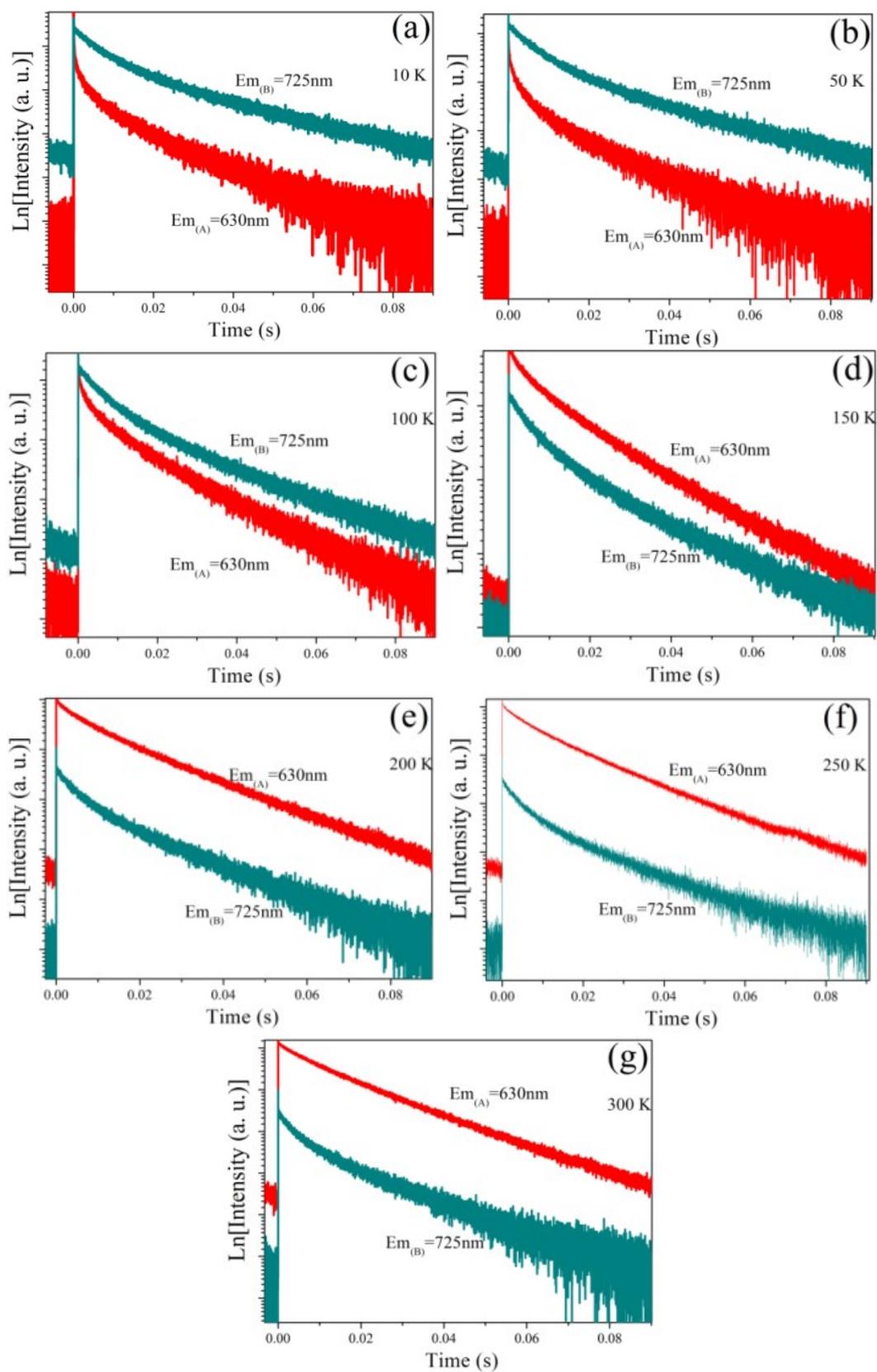
**Figure S-3** The experiments of luminescence quantum efficiency (QE) of  $(\text{Mg}_{1-x}\text{Mn}_x)_2\text{P}_2\text{O}_7$  ( $x = 0.15$ ) with the excitation of 420 nm.



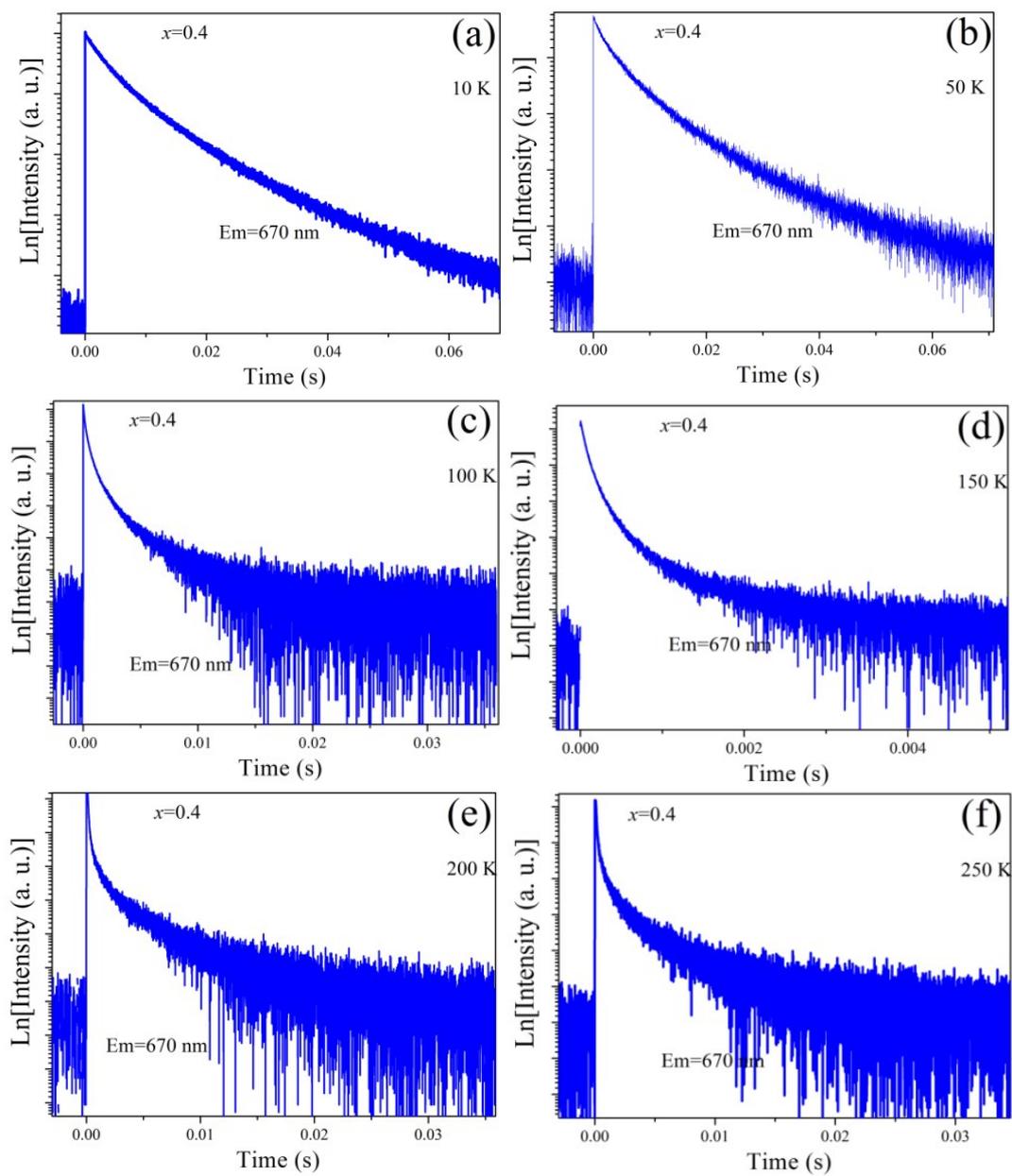
**Figure S-4** the temperature-dependent FWHM (full width at half maximum) of  $(\text{Mg}_{1-x}\text{Mn}_x)_2\text{P}_2\text{O}_7$  with  $x=0.4$  and  $x=0.8$ .



**Figure S-5** the temperature-dependent decay curves of  $(\text{Mg}_{1-x}\text{Mn}_x)_2\text{P}_2\text{O}_7$  with  $(x=0.005)$  by monitoring the luminescence from  $\text{Mn}^{2+}(\text{A})$  and  $\text{Mn}^{2+}(\text{B})$ .

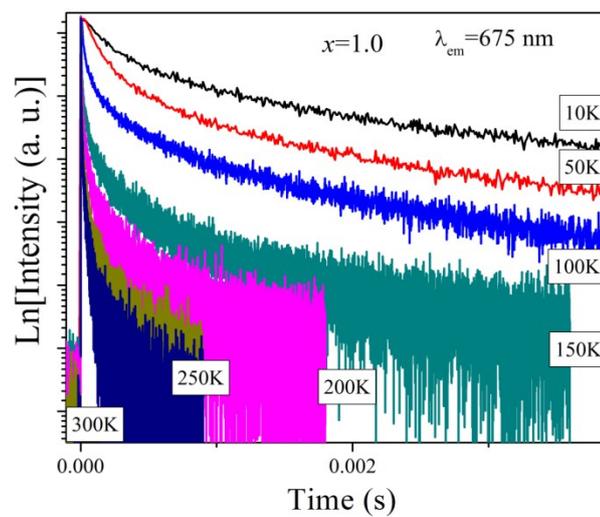


**Figure S-6** the temperature-dependent decay curves of  $(\text{Mg}_{1-x}\text{Mn}_x)_2\text{P}_2\text{O}_7$  with  $(x=0.1)$  by monitoring the luminescence from  $\text{Mn}^{2+}(\text{A})$  and  $\text{Mn}^{2+}(\text{B})$ .



**Figure S-7** the temperature-dependent decay curves of  $(\text{Mg}_{1-x}\text{Mn}_x)_2\text{P}_2\text{O}_7$  with  $(x=0.4)$  by

monitoring the luminescence from  $\text{Mn}^{2+}$ .



**Figure S-8** the temperature-dependent decay curves of  $(\text{Mg}_{1-x}\text{Mn}_x)_2\text{P}_2\text{O}_7$  with  $(x=1.0)$  by monitoring the luminescence from  $\text{Mn}^{2+}$ .