

Supplementary Information - Evaluation of the effect of site substitution of Pr doping in the Lithium
garnet system $\text{Li}_5\text{La}_3\text{Nb}_2\text{O}_{12}$

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Comparative XRD patterns before and after densification via high temperature N_2 heat treatments, showing increased phase degradation as Pr content increased. Additionally, in figure S1a an XRD pattern is shown after storage in an Ar glove box for 1 week.

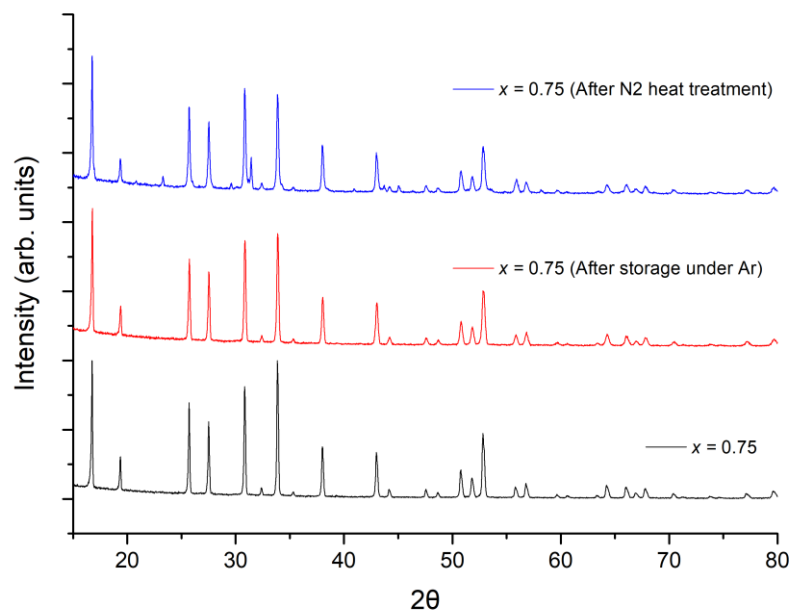


Figure S1a. XRD patterns for $Li_{5.75}La_3Nb_{1.25}Pr_{0.75}O_{12}$ freshly synthesised, after storage in a Ar glove box for 1 week and after the high temperature N_2 treatment, the latter of which shows phase degradation.

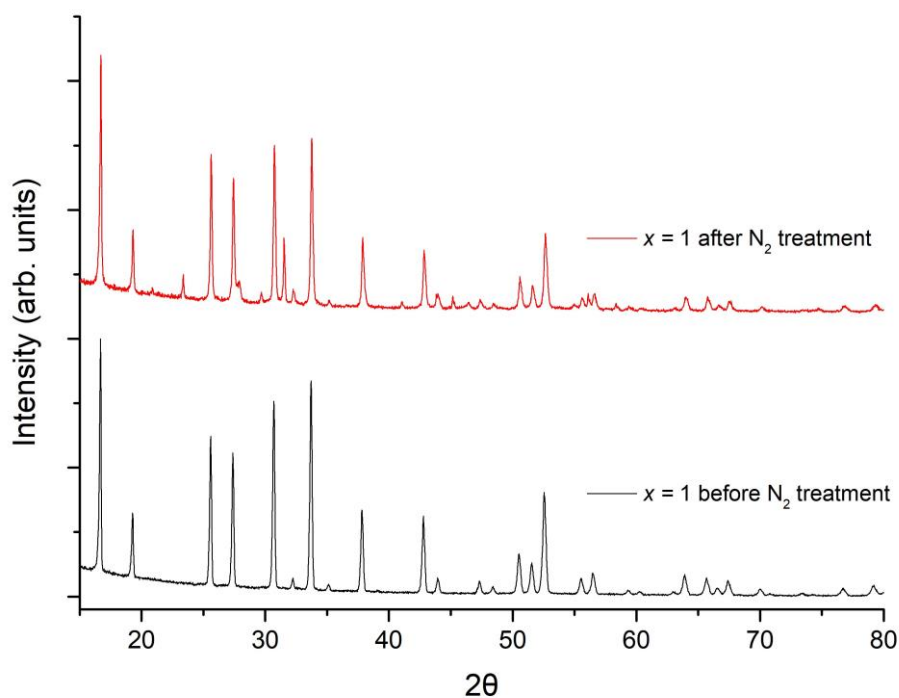


Figure S1b. XRD patterns for $Li_6La_3Nb_1Pr_1O_{12}$ freshly synthesised and after the high temperature N_2 treatment, the latter of which shows more severe phase degradation than $x = 0.75$

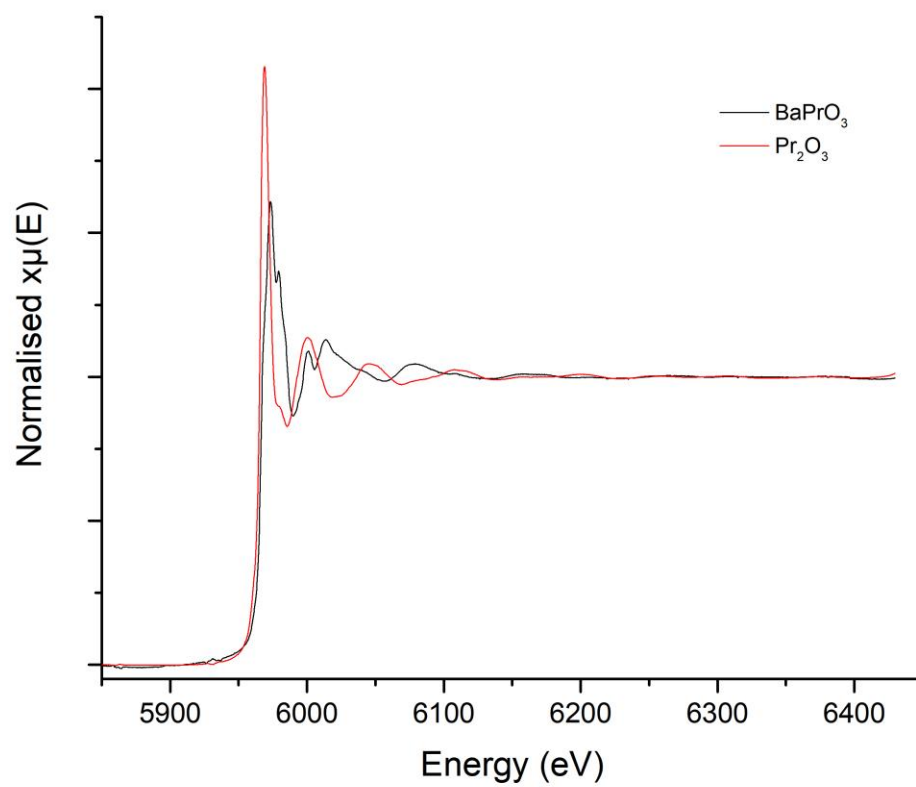


Figure S2. XANES spectra of reference samples Pr_2O_3 and BaPrO_3 overlaid.

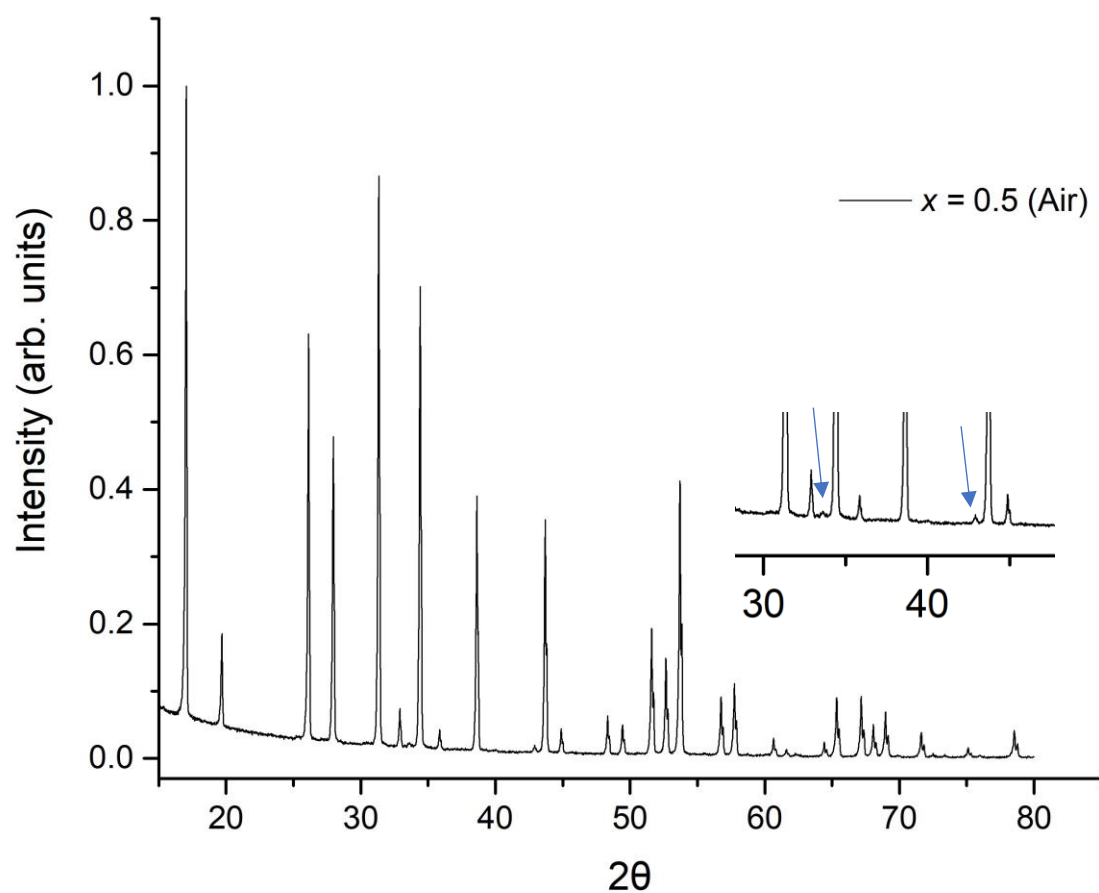


Figure S3. Example XRD of La site doping ($x = 0.5$ synthesised in air) showing small Li_3NbO_4 impurity, marked additionally with arrows in the magnified inlay. This impurity was noted for all air-based synthesis and in some H_2 synthesised phases.

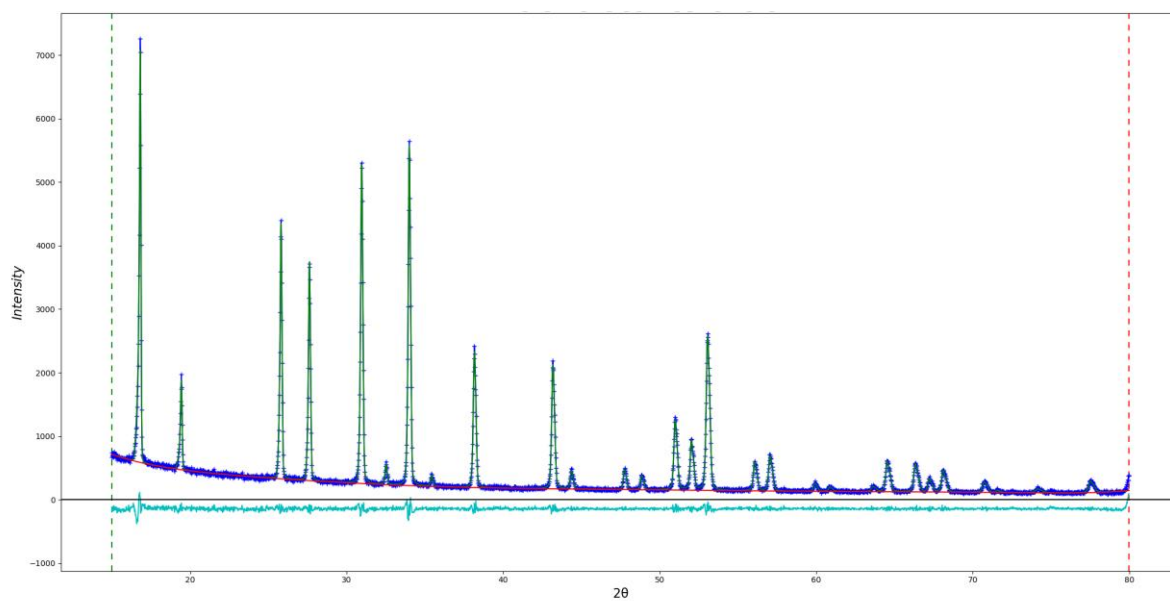


Figure S4. Example Rietveld refinement of Pr LLNO garnet materials. The above example is of $\text{Li}_{5.5}\text{La}_3\text{Nb}_{1.5}\text{Pr}_{0.5}\text{O}_{12}$

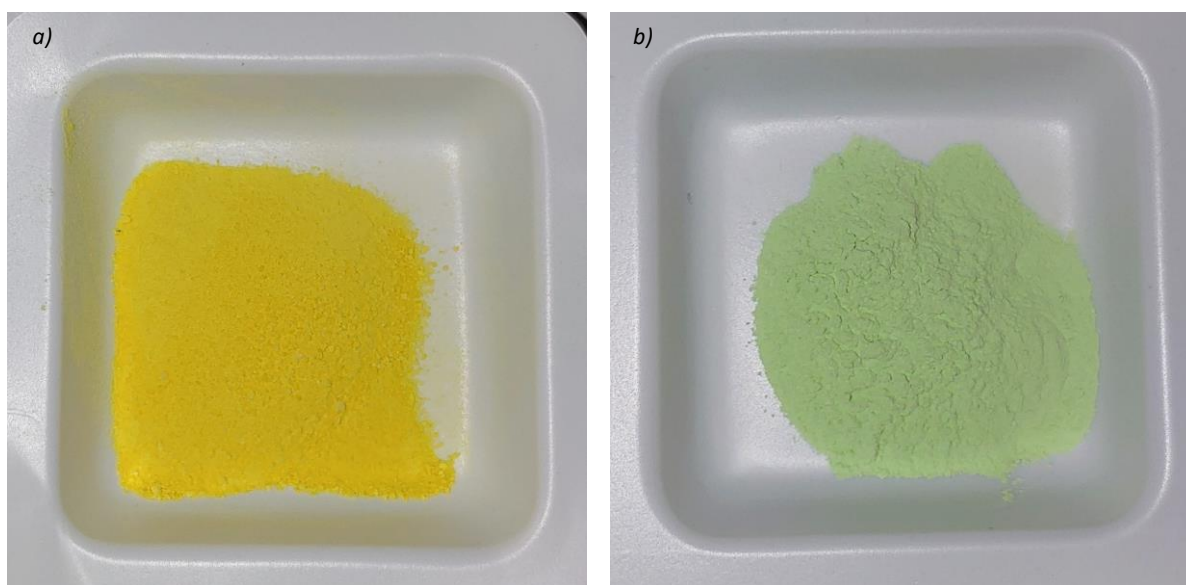


Figure S5. Powder colours of lithium garnet phases where a) is $\text{Li}_{5.25}\text{La}_3\text{Nb}_{1.75}\text{Pr}_{0.25}\text{O}_{12}$ and b) is $\text{Li}_5\text{Pr}_{2.5}\text{La}_{2.5}\text{Nb}_2\text{O}_{12}$ synthesised under 5% H_2