Supplementary material to Nodal-to-nodeless superconducting order parameter in $LaFeAs_{1-x}P_xO$ synthesized under high pressure

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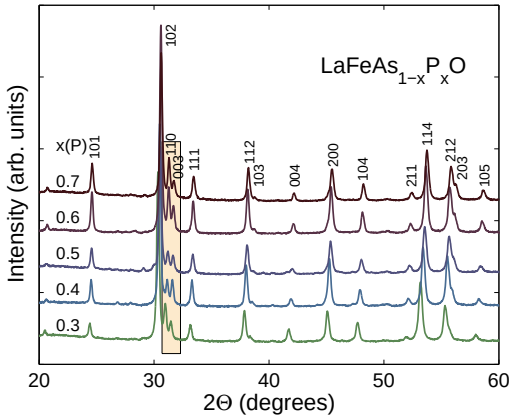
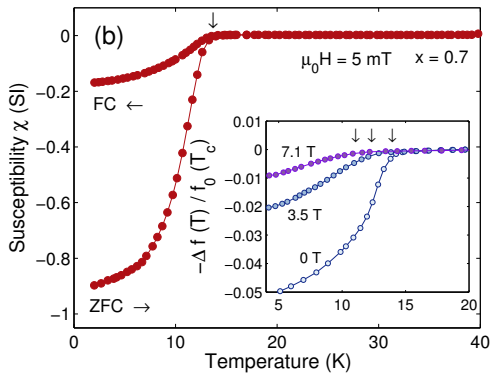
The detailed x-ray diffraction patterns are shown in Fig. 1. Here the main peaks refer to the diffraction from the LaO and FeAs(P) planes, while the highlighted area indicates the minor peaks corresponding to reflections from the (110) and (003) planes, which relate to the local arrangement of atoms. The latter differs significantly from that of samples grown at ambient pressure, hence justifying the rather different properties of samples grown under high-pressure conditions.



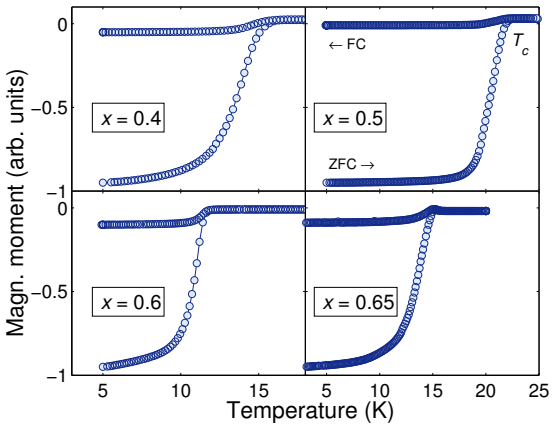
Supplementary Figure 1 | Powder diffraction patterns. The room-temperature x-ray powder diffraction patterns of $LaFeAs_{1-x}P_xO$ exhibit a regular evolution with x and show no traces of spurious phases. The multiple peaks close to 30 degrees (highlighted area) evolve differently from those in samples grown under ambient pressure, indicating a different local environment within the FeAs planes.



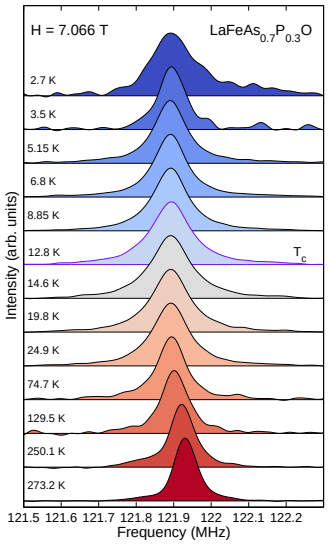
Supplementary Figure 2 | Magnetic susceptibility data. Zero field-cooled (ZFC) and field-cooled (FC) dc susceptibility vs. temperature measured at 5 mT in the $x = 0.7$ case. Inset: tank-circuit detuning vs. T at different applied fields was used to determine $T_c(H)$. Arrows denote the T_c positions.

Data on magnetization are reported in Fig. 2. Due to a rather high estimated $H_{c2}(0)$ value of ca. 70 T, the applied magnetic fields chosen for the NMR measurements do not induce a significant lowering of T_c, with both magnetometry and in-situ RF detuning showing a shift in T_c of ca. −2.5 K at 7 T (see inset).

From the analogous magnetization data for the rest of the investigated samples, shown in Fig. 3, we determine the relevant critical T_c values, as reported in Fig. 7.



Supplementary Figure 3 | Magnetization data for all the samples. Zero field-cooled (ZFC) and field-cooled (FC) dc magnetization vs. temperature measured in fields of 3 to 10 mT for the $x = 0.4$, 0.5, 0.6, and 0.65 case. The FC and ZFC curves, as well as the relevant T_c are indicated in the $x = 0.5$ panel.



Supplementary Figure 4 | Representative ^{31}P NMR line shapes in $LaFeAs_{1-x}P_xO$ (for $x = 0.3$) at $\mu_0 H = 7.066$ T and temperatures in the 2.7 to 270 K range. The increased line width below $T_c = 12$ K reflects the onset of the superconducting phase.