

Synthesis of LiFePO_4 Using Steelmaking Slag as Phosphorus Source

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1 INTRODUCTION

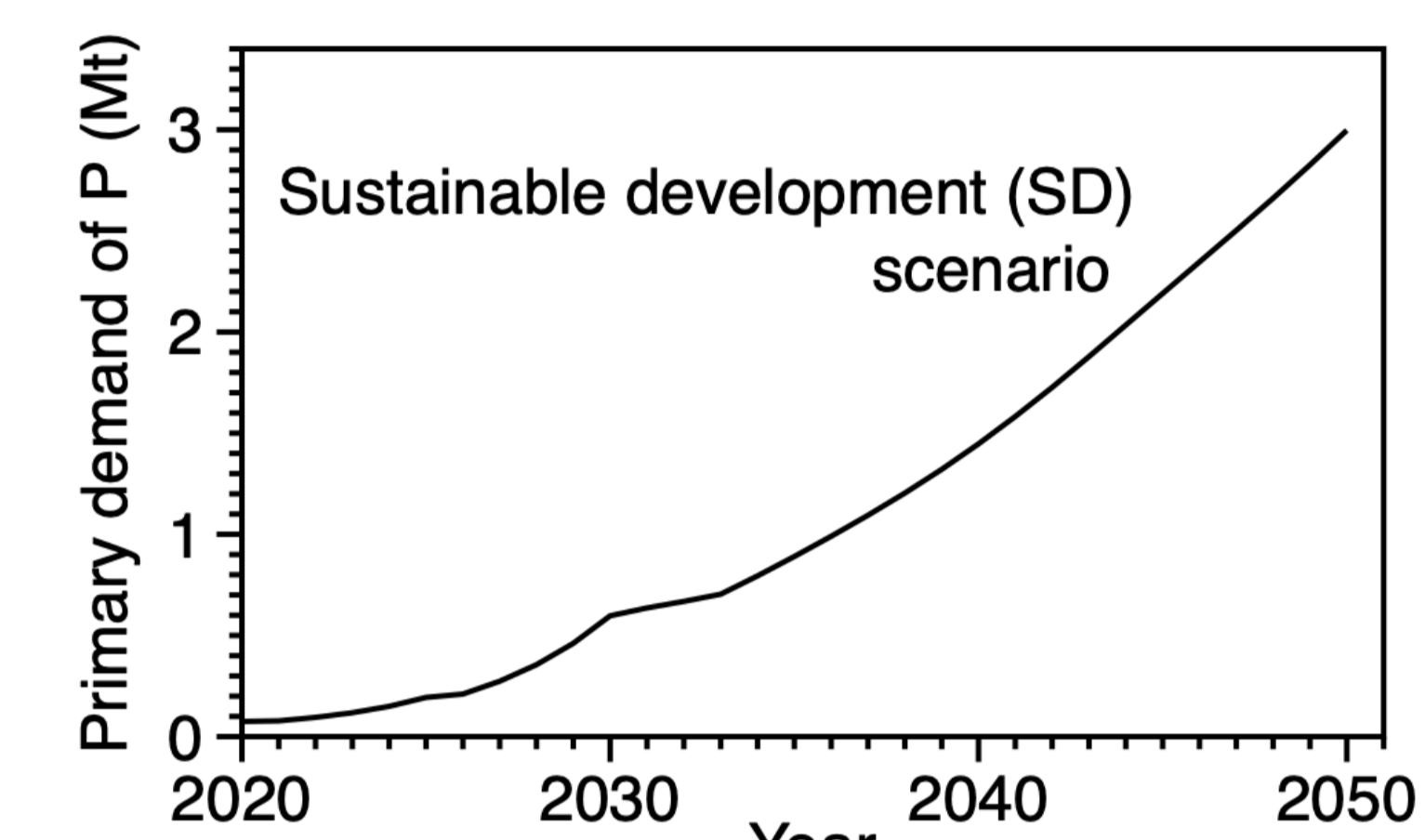
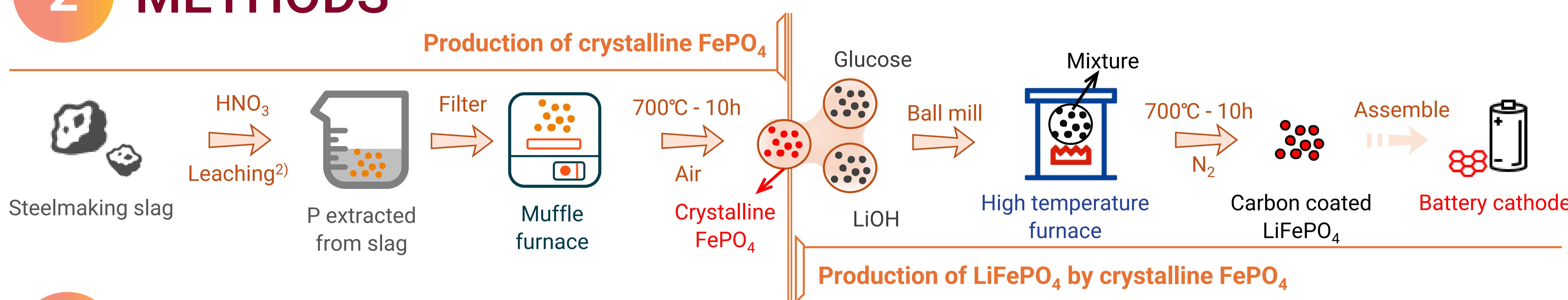


Fig. 1. Battery phosphorus flows in the LiFePO_4 battery scenario.¹⁾

With the intensive increase on electric vehicle production, demand of P has been predicted to exceed 3Mt by 2050.

2 METHODS



3 RESULTS AND DISCUSSION

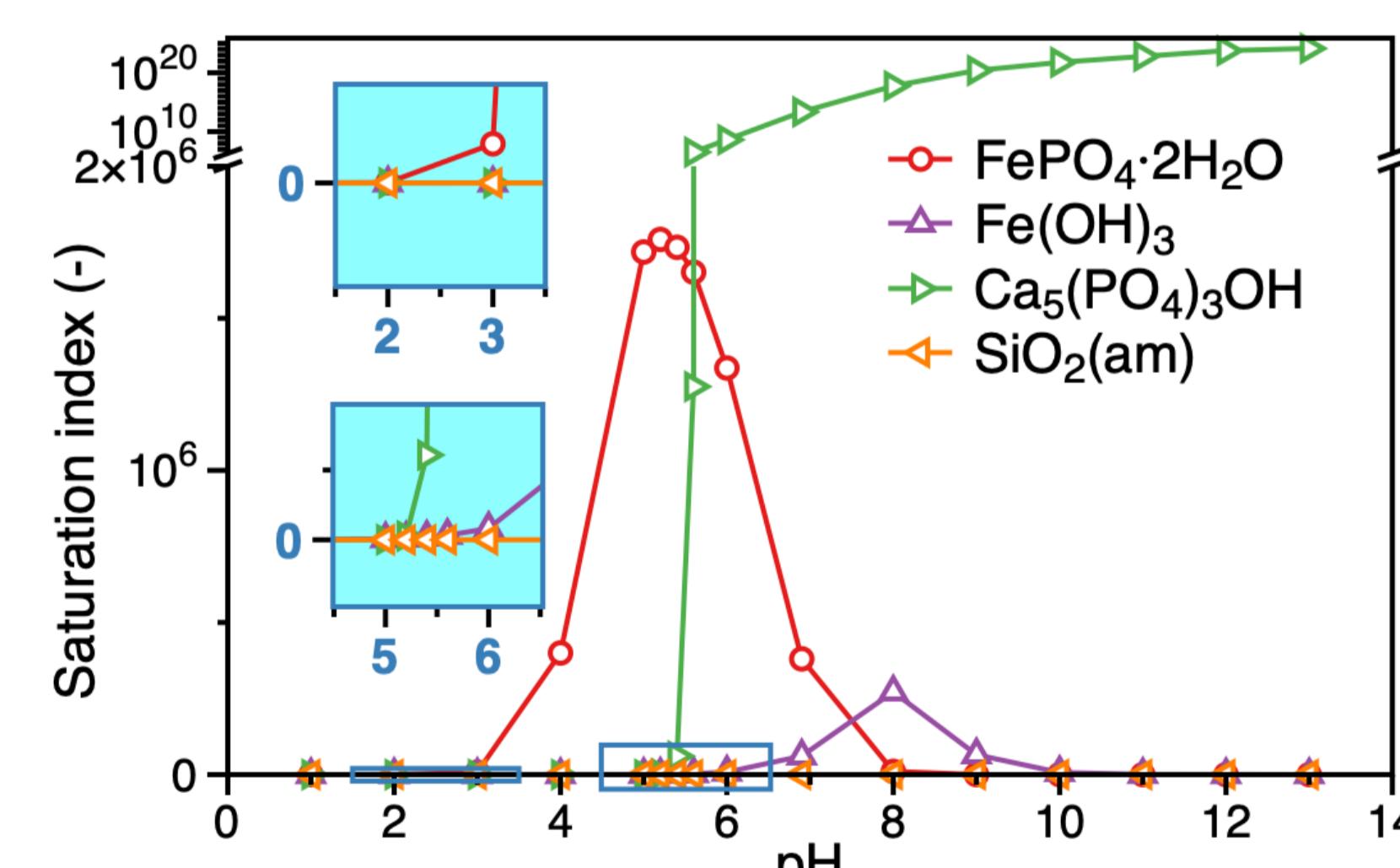


Fig. 2. Comparison of the calculated solubility of possible precipitation in the extract.

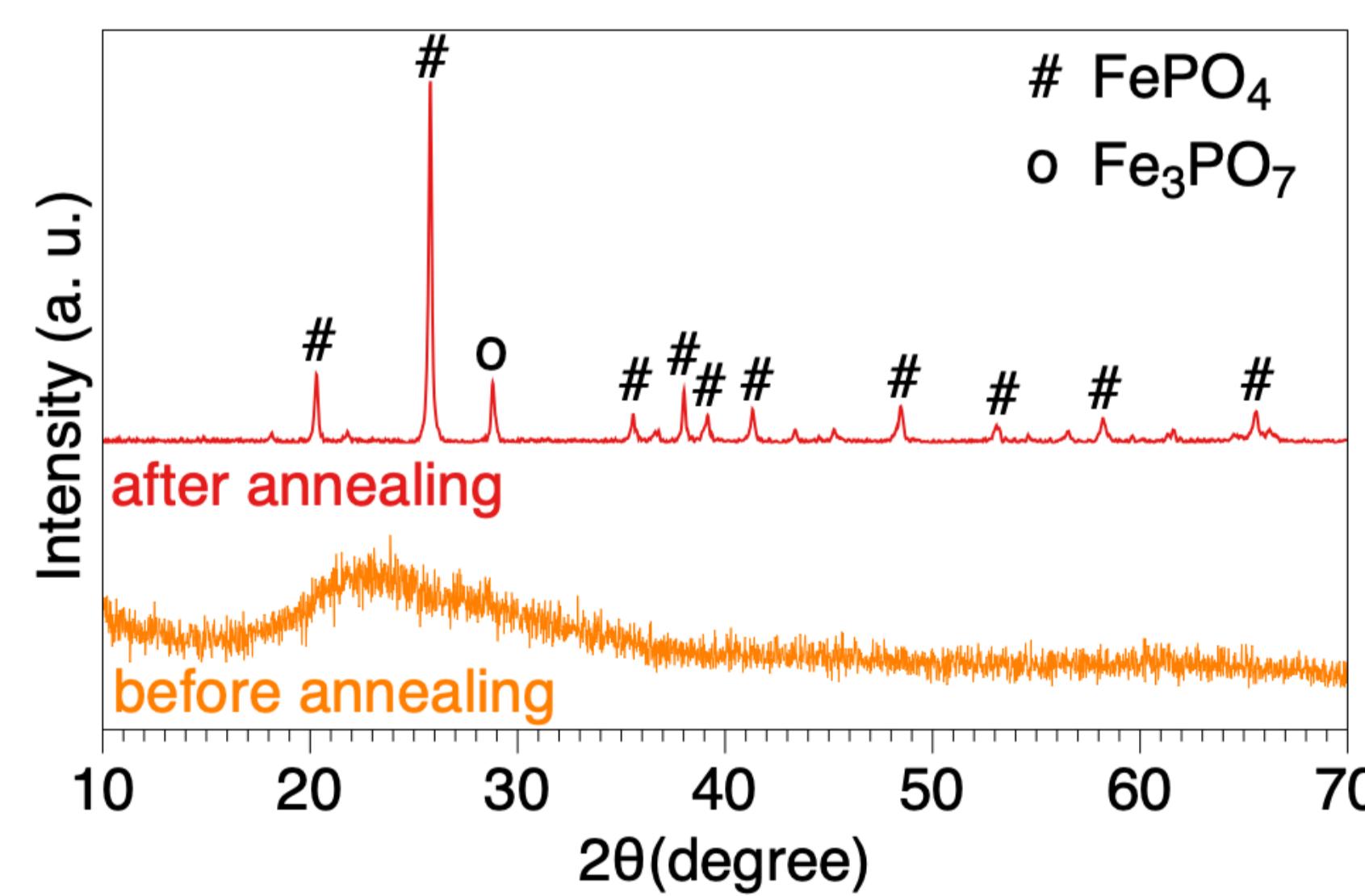


Fig. 3. XRD results of the precipitated FePO_4 before and after annealing.

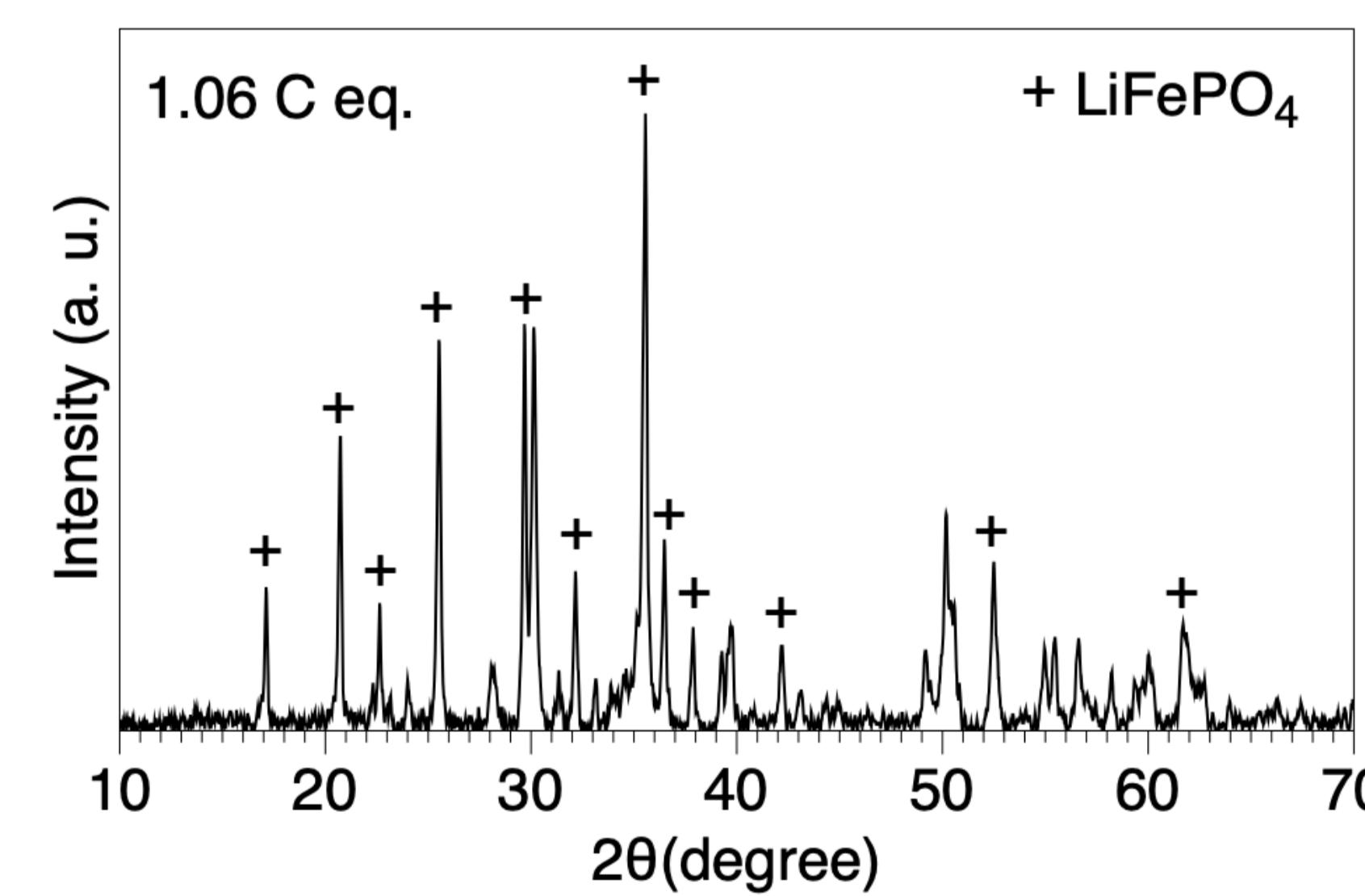


Fig. 4. The XRD result of the synthesized LiFePO_4 .

pH was adjusted to 3 in slag leaching using HNO_3 for $\text{FePO}_4 \cdot 2\text{H}_2\text{O}$ precipitation.

Amorphous phase change to crystal after the annealing.

Impurities in the steelmaking slag keep away from the LiFePO_4 crystal.

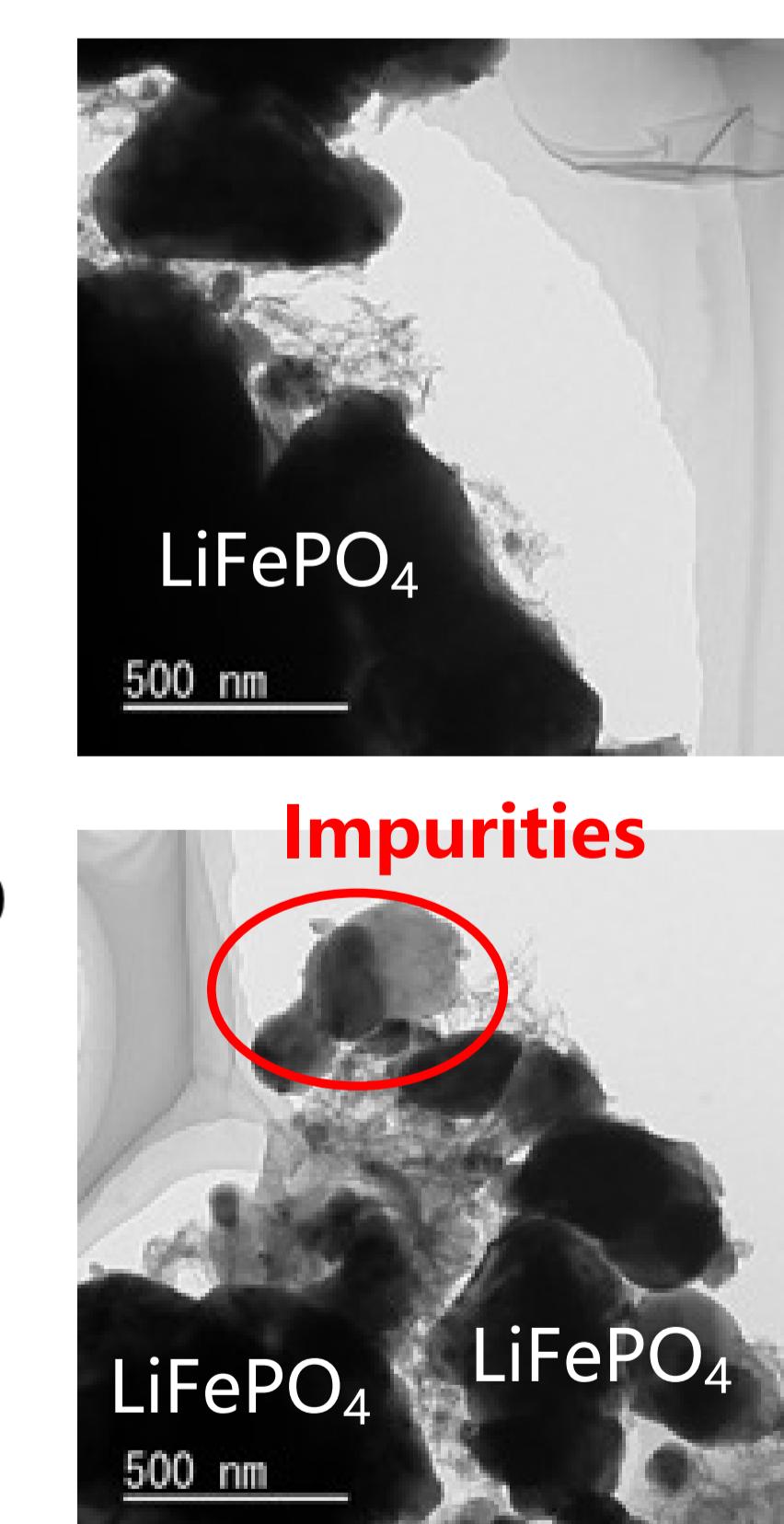


Fig. 5. The TEM result of the synthesized LiFePO_4 .

4 CONCLUSION

- Steelmaking slag can be used as alternative P source to synthesize LiFePO_4 .
- Phosphorus in the steelmaking slag leachate can be extracted by FeCl_3 as crystallization FePO_4 to further synthesize LiFePO_4 .
- The impurities in the steelmaking slag have no effect on crystallization process of FePO_4 and LiFePO_4 .

REFERENCES

1) Chengjian Xu, 2022, Commun Mater, 3, 15.

2) Takayuki IWAMA, 2018, ISIJ International, 58(7), 1351–1360.