

Citric acid modified Ni₃P as a catalyst for aqueous phase reforming and hydrogenolysis of glycerol to 1,2-PDO

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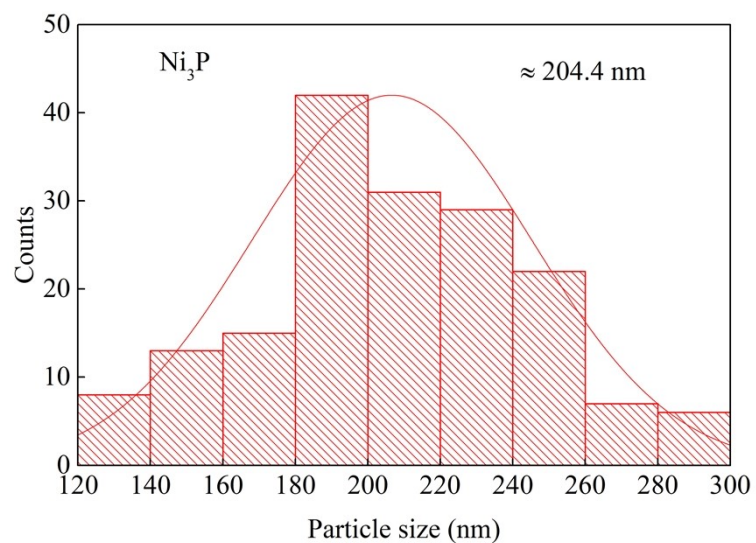


Fig. S1. Particle size distributions of Ni_3P catalyst.

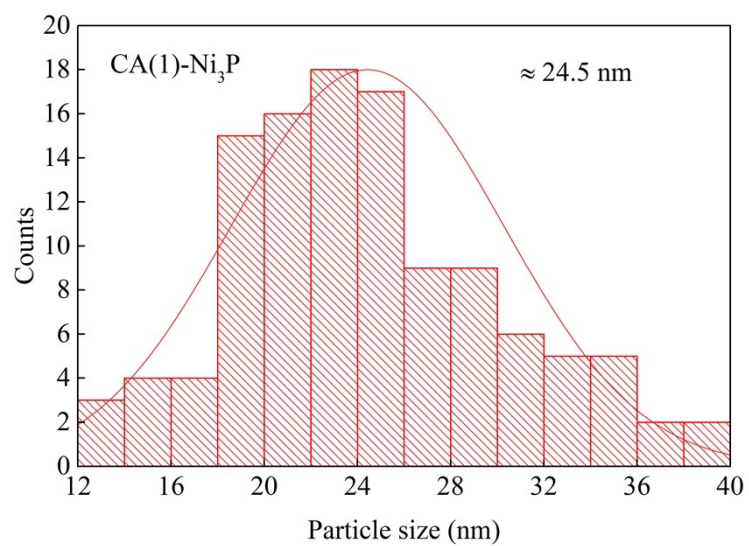


Fig. S2. Particle size distributions of CA(1)- Ni_3P catalyst.

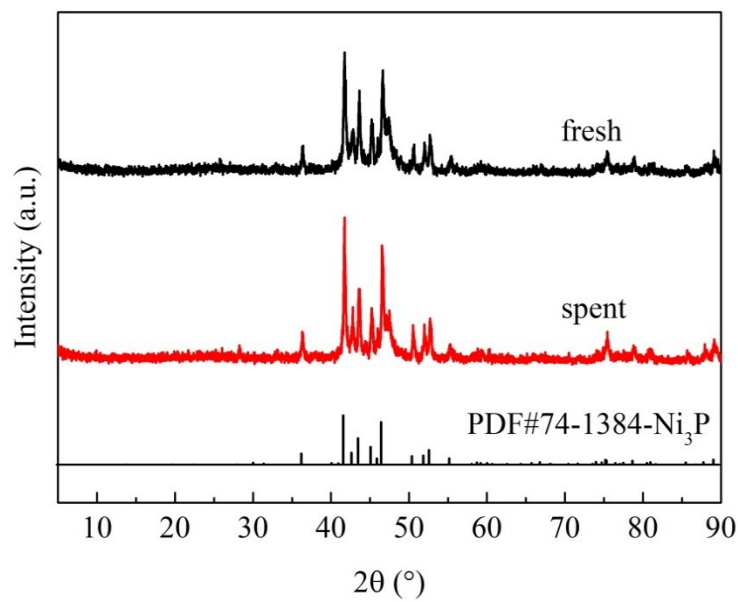


Fig. S3. The XRD patterns of fresh and spent CA(1)-Ni₃P catalysts.

Table S1. Recyclability of the CA(1)-Ni₃P catalyst in APR and glycerol hydrogenolysis.

| Cycles | Conv. (%) | Selectivity (%) | | | | | | | | | | | H ₂ (mmol) |
|--------|-----------|-----------------|--------|-----|------|------|-----------------|-------------------------------|-------------------------------|------|-----------------|--------|-----------------------|
| | | 1,2-PDO | Acetol | EG | EtOH | 1-PO | CH ₄ | C ₂ H ₆ | C ₃ H ₈ | CO | CO ₂ | Others | |
| 1 | 74.6 | 43.2 | 16.0 | 5.7 | 4.3 | 5.6 | 0.7 | 0.4 | 0.1 | 0.2 | 11.8 | 11.9 | 2.1 |
| 2 | 52.2 | 19.0 | 26.1 | 2.4 | 12.4 | 13.0 | 0.8 | 0.6 | 0.1 | 1.5 | 2.5 | 21.7 | 1.0 |
| 3 | 17.4 | 14.5 | 56.1 | 0 | 17.4 | 1.6 | <0.1 | <0.1 | <0.1 | <0.1 | 0.1 | 10.4 | 0.5 |

Reaction conditions: glycerol 2 g, water 18 g, CA(1)-Ni₃P 0.2 g, 220 °C, 0.5 MPa N₂, 8 h, 750 rpm.