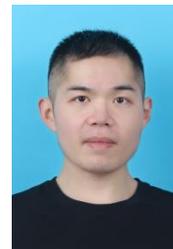


Curriculum Vitae

An Wang

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After graduated from Hubei university, I conducted Successive Study of Master and Doctoral degree in Dalian Institute of Chemical Physics. During this period, I joined Professor Tao Zhang group for single-atom catalysts (SACs) study. Professor Aiqin Wang is my Ph.D. supervisor and my research concentrated on heterogeneous carbonylation reaction, part of results have been published in JACS.

Education

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| 2017.09-2024.06 | Ph.D. in Major
Dalian Institute of Chemical Physics, Chinese Academy of Sciences |
| 2013.09-2017.06 | B.Sc. in Major
Hubei University in China |
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Research experience

Single-atom catalysts (SACs), Surface vacancies engineering, Alkoxy carbonylation and hydroformylation, there detailed main projects as below:

Ethylene methoxycarbonylation over the Pt₁/MoS₂ Single-atom catalyst

Synthesis Pt₁/MoS₂ where the Pt exclusively located in edge site. We used XAS and DFT and discovered a pocket-like structure Mo-S-Pt₁-S-Mo on edge site. We found this Pt₁/MoS₂ can be used as an excellent heterogeneous catalyst for ethylene methoxycarbonylation (EMC) without any acid additions. The TOF of Pt₁/MoS₂ can reach 150.9 h⁻¹ with selectivity keeping 90%. We took ATR-IR and DFT calculation for reaction mechanism and found reaction follow Pt-H route. This is the first example of heterogeneous SAC for EMC.

Acetylene methoxycarbonylation over the Ni-N₄-CO Single-atom catalyst

We develop Reaction-Induced Chemical Vapor Deposition (RI-CVD) Strategy to Construct Ni-N₄-CO Sites for Acid-free Methoxycarbonylation of Alkyne. The reaction rate reach 1.4 g_{product} g_{cat}⁻¹ h⁻¹ and selectivity keep 97 %. By contrast, traditional Ni-N-C SACs show no any activity. We used XAS, DFT, XES characterization and found special coordination structure Ni-N₄-CO contributed this great catalytic performance. This is the first example of heterogeneous SAC for AMC. (Under revised)

Such RI-CVD Strategy can be expanded to other M-N-C such as Co, Fe, Mo, W, et.al.

Edge S Vacancies on MoS₂ for methoxycarbonylation of Ethylene/Acetylene

We discover the S vacancies (SVs) on MoS₂ can also be used as effective active site for methoxycarbonylation of ethylene or acetylene. We used NO chemisorption and O₂-DRIFT, titration experiments to ensure the SVs in edge of MoS₂ is genuine active center. The reaction rate reaches 1.3 g_{product} g_{cat}⁻¹ h⁻¹ and selectivity keep 80 %. This example shows the vacancies in support have great potential for heterogeneous methoxycarbonylation. (Prepared for submitted)

Surface S Vacancies on Co₉S₈ for methoxycarbonylation of Ethylene

We discover the S vacancies (SVs) on Co₉S₈ can also be used as effective active site for methoxycarbonylation of ethylene. The reaction rate reach 10.4 g_{product} g_{cat}⁻¹ h⁻¹ and selectivity keep 90 %. (Under study now)

Professional skills

Reaction equipment: Tank reactor, GC, MS, Glove box

Reaction type: Alkoxy carbonylation, Hydroformylation, Dehydrogenation of formate, and Hydrogenation of CO₂

Catalysts: SACs, Nano-catalysts

Characterization: CO-DRIFT, XAS fitting, DFT, ATR-IR, et.al.

English: IELTS-6.5

Publication

1. **An, Wang**, Leilei, Zhang, Zhounan, Yu. et.al. Ethylene Methoxycarbonylation over Heterogeneous Pt₁/MoS₂ Single-Atom Catalyst: Metal-Support Concerted Catalysis. Journal of the American Chemical Society, 2023, 146(1) 695-706

2. **An, Wang**, Hongchen, Cao, leilei, Zhang, et.al. Co/SiO₂ catalyst for methoxycarbonylation of acetylene: on the catalytic performance and active species. Molecules 2024, 29, 1987

3. **An, Wang**, et.al. Reaction-induced Chemical Vapor Deposition Strategy to Construct Ni-N₄-CO Sites for Acid-free Methoxycarbonylation of Alkyne (Under revised)

4. **An, Wang**, et.al. Heterogeneous methoxycarbonylation of ethylene/acetylene over edge-sulfur vacancies of MoS₂. (Prepared for submitted)

5. **An, Wang**, et.al. Multifunction Co assemble site around S vacancies in Co₉S₈ for heterogeneous methoxycarbonylation of ethylene. (Prepared for submitted)

References

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