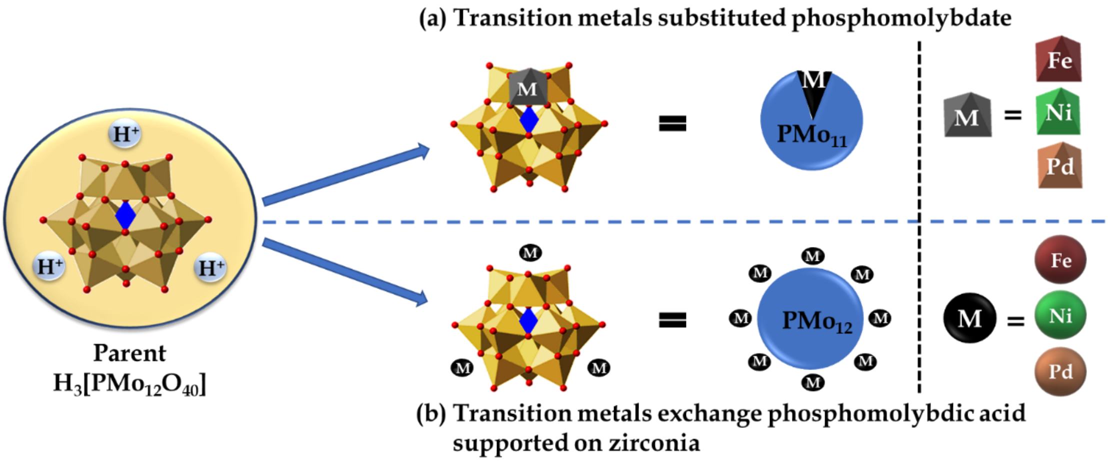
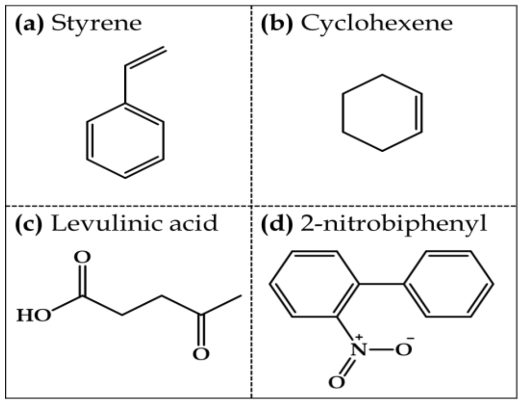
Main Conclusion

- We have successfully designed catalytic materials comprising of transition metals (Fe, Ni and Pd) and phosphomolybdic acid by two different ways.



- The catalytic activity of all designed catalysts was evaluated towards hydrogenation (styrene, cyclohexene, levulinic acid and Tandem SM cross coupling/ nitro hydrogenation) reactions.



- For all reactions, the preference of the catalysts was found to be

  $PMo_{11}Fe$, $PMo_{11}Ni$ and $PMo_{11}Pd$ $<$ **$Fe\text{-}PMo_{12}/ZrO_2$, $Ni\text{-}PMo_{12}/ZrO_2$ and $Pd\text{-}PMo_{12}/ZrO_2$**

  because of the structure diversity of suberates as well as position of metal.
- In all transformation, the TON number in the range of 927 – 5031 (>1000), indicating that all the catalysts can be applied for small scale industries.
- Our study confirmed that phosphomolybdic acid also acts as stabilization agent due to its unrivaled structural versality in both size and symmetry.
- Finally, the SASc designed strategy can be extended for the design of other precious metal-based single-atom site catalysts for various organic transformations.