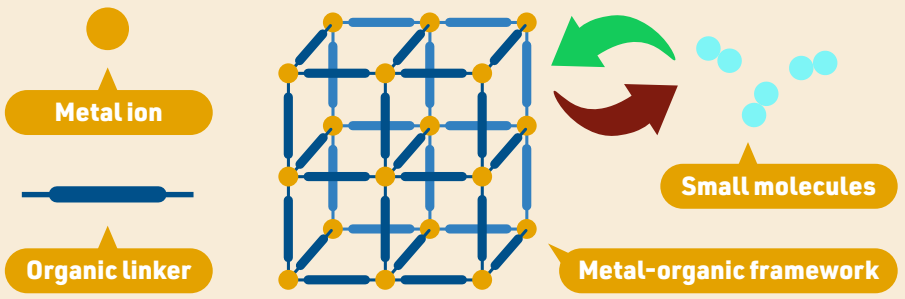
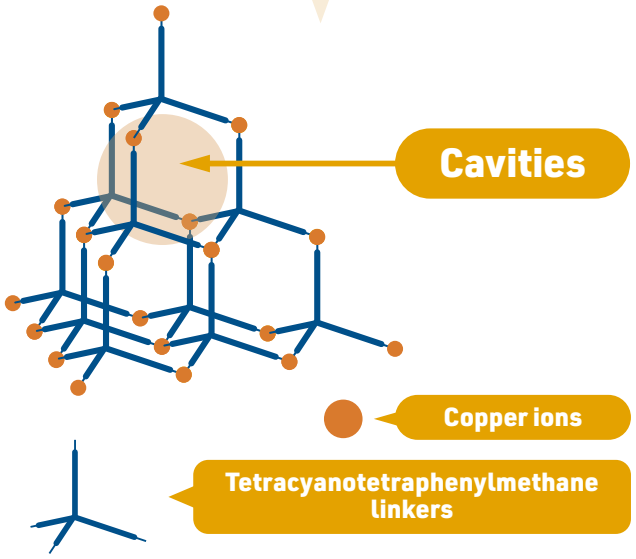
The 2025 Nobel Prize in Chemistry

The 2025 Nobel Prize in Chemistry was awarded to **Susumu Kitagawa**, **Richard Robson**, and **Omar M. Yaghi** for the development of metal-organic frameworks.

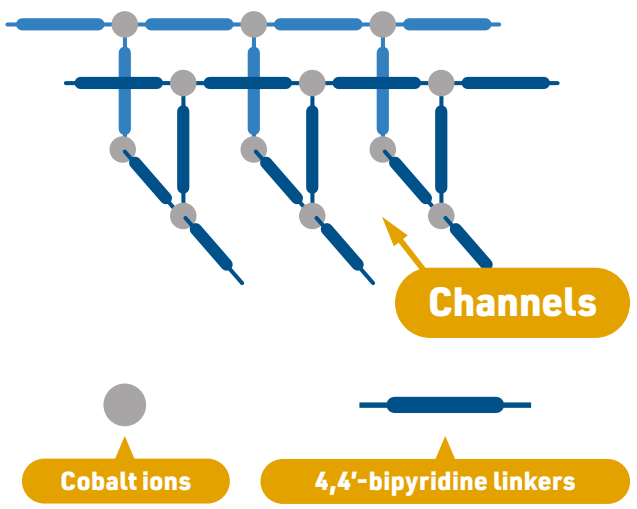
Metal-organic frameworks are molecular sponges. They're built up from metal ions and organic compounds that act as linkers. This forms the sponge structure. Like a sponge, there are holes, or cavities, throughout the metal-organic framework. Small molecules such as gases can move into and out of these holes.



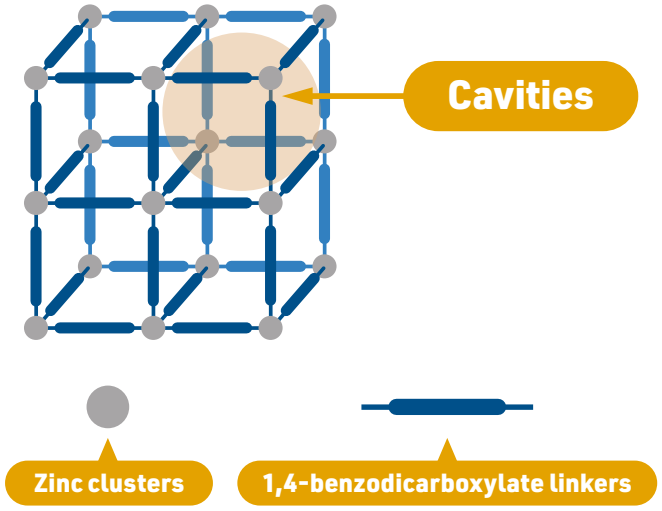
In 1989, **Richard Robson** combined copper ions with a four-armed molecule, making a large network similar to the arrangement of carbon atoms in diamond. The structure was unstable but contained cavities which other molecules or ions could move into and out of.



In 1997, **Susumu Kitagawa** created a stable metal-organic framework with channels that could be filled with gases. He later proposed and produced flexible metal-organic frameworks that could be filled and emptied of different substances.



In 1999, **Omar M. Yaghi** made a metal-organic framework, MOF-5, with huge internal spaces. Two grams of MOF-5 has an internal surface area the size of a football pitch. Yaghi also built MOFs of differing sizes by varying the organic linking unit.



WHY DOES THIS RESEARCH MATTER?

Metal-organic framework have potential applications including gas storage, extracting water from air, delivering medicines to specific parts of the body, speeding up chemical reactions and detecting toxic chemicals.

Nobel Prize in Chemistry press release: https://www.nobelprize.org/prizes/chemistry/2025/press-release/