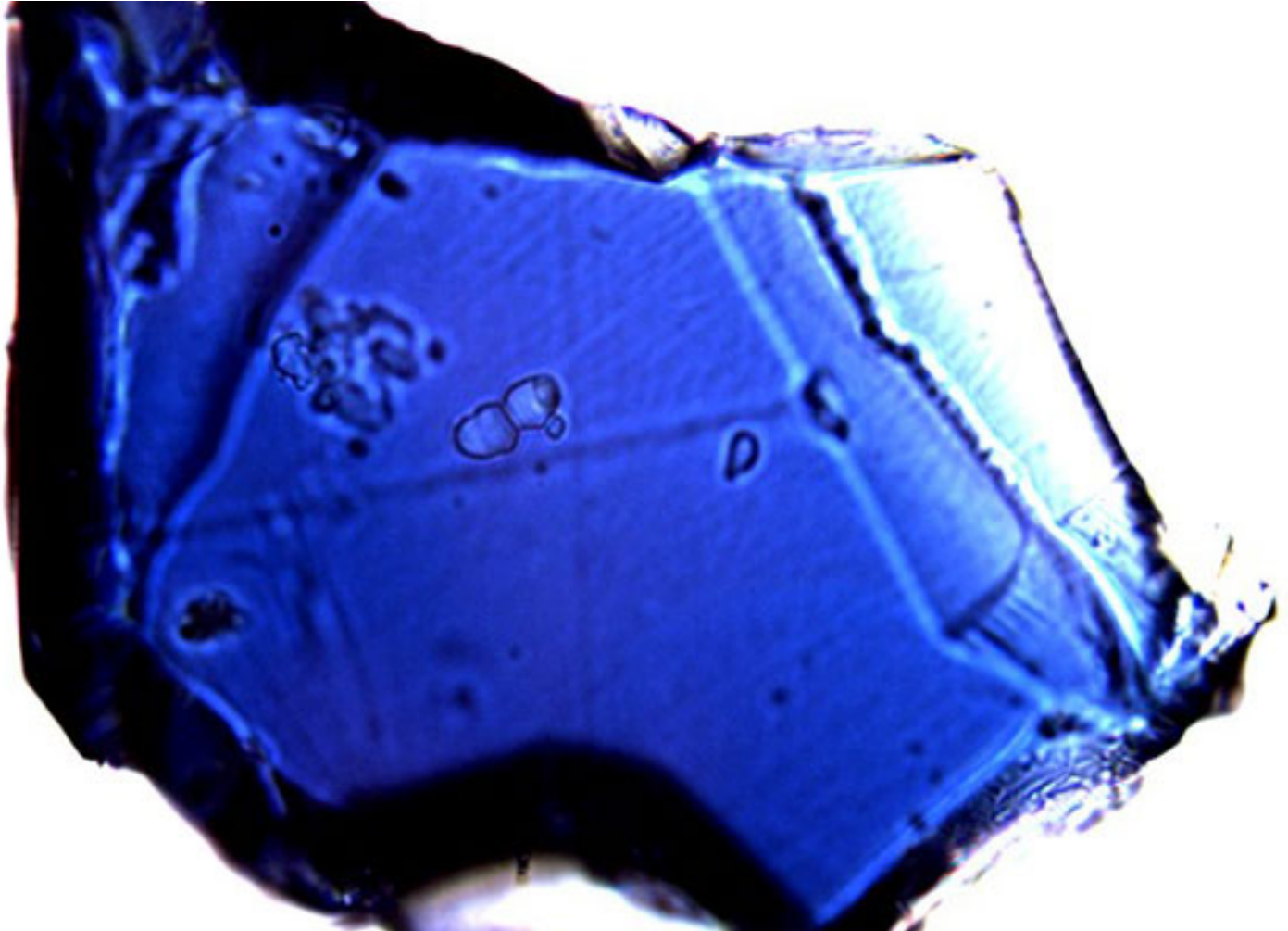


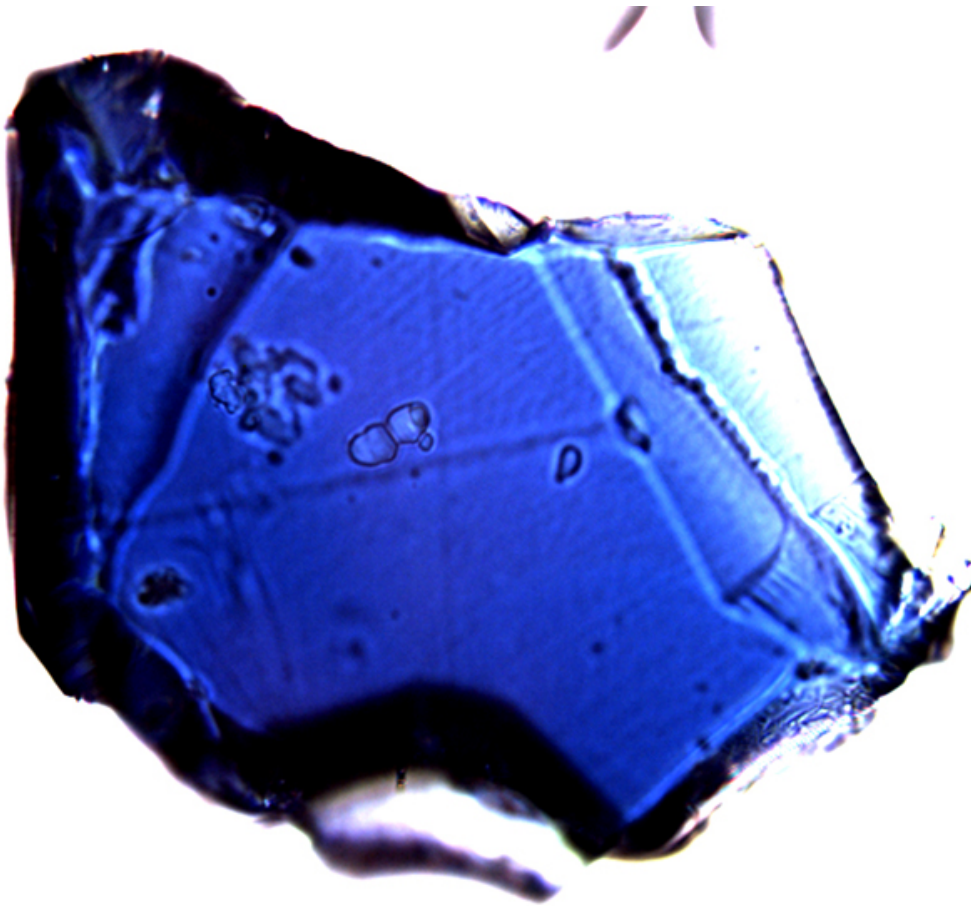
Ringwoodite

By IASToppers | 2024-04-16 15:35:00



Ringwoodite

Recent seismic studies have revealed the existence of a colossal subterranean ocean, challenging conventional theories about Earth's water sources and cycles.



[ref-Wikipedia]

Discovery of the Subterranean Ocean:

- The existence of this underground ocean was confirmed through the study of **seismic waves generated by earthquakes**.
- These waves **travel through the Earth's interior** and **their speed can be affected** by the **presence of different materials**, including **water**.
- By analyzing the speed of these waves, **scientists can infer the composition of the Earth's inner layers**.
- In a paper "Dehydration melting at the top of the lower mantle," researchers presented evidence of a **high water storage capacity** in the **minerals of the Earth's mantle transition zone**, which ranges from 410 to 660 kilometers in depth.
- This zone could potentially host a deep water reservoir, leading to the possibility of dehydration melting: a **process that could trap water within the Earth's mantle**.

Ringwoodite:

- Ringwoodite is a vivid blue mineral that exists in the **Earth's transition zone**.
- It is a **high-pressure phase of Mg_2SiO_4** (magnesium silicate) formed at **high temperatures and pressures** in the **Earth's mantle**, typically between 525 and 660 kilometers depth.
- It is a **water-rich mineral** that can **contain iron and hydrogen**.
- It is polymorphous with the **olivine phase forsterite**, which is a magnesium iron silicate.

- It has a unique **crystal structure that allows it to absorb water and hydrogen**, acting like a sponge.
- It **can hold a significant amount of water**, and the **discovery of hydrated ringwoodite samples supports the theory of a vast subterranean ocean**.
- It was first identified in the **Tenham meteorite** in 1969.
- It is named after Australian earth scientist **Alfred E. Ringwood**, who studied polymorphic phase transitions in common mantle minerals such as olivine and pyroxene.