High-sensitive analysis of metal impurities on Si & SiC substrates—ICP-MS—

Inductively Coupled Plasma Mass Spectrometry (ICP-MS) enables high-sensitive, high-accuracy analysis of metal impurities on various semiconductor substrates. By applying the optimum preparation to each substrate and element, various metal impurities can be evaluated quantitatively.

Impurity analysis on Si substrate

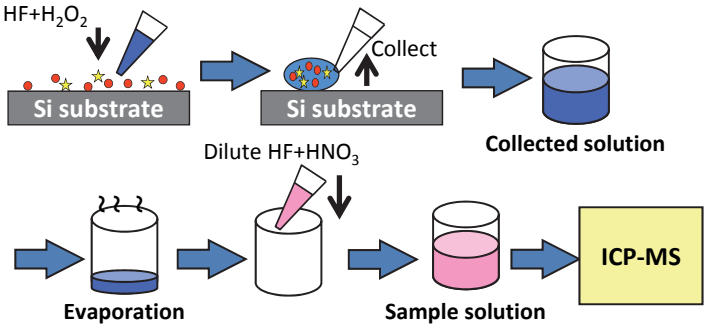

Fig.1 Analytical flow of metal impurities on Si substrate.

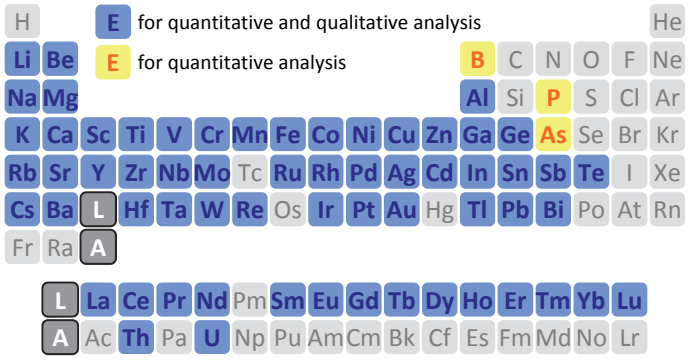

Fig.2 Elements applied to the surface analysis of Si substrate.

- Similar methods can be applied to analyze various substrates(SiC, quartz, sapphire) and films(SiO_2, SiN, metal, organic).

Recoveries of metal impurities on Si & SiC substrates

Each element deposited on Si and SiC substrate surfaces was analyzed using typical preparation.

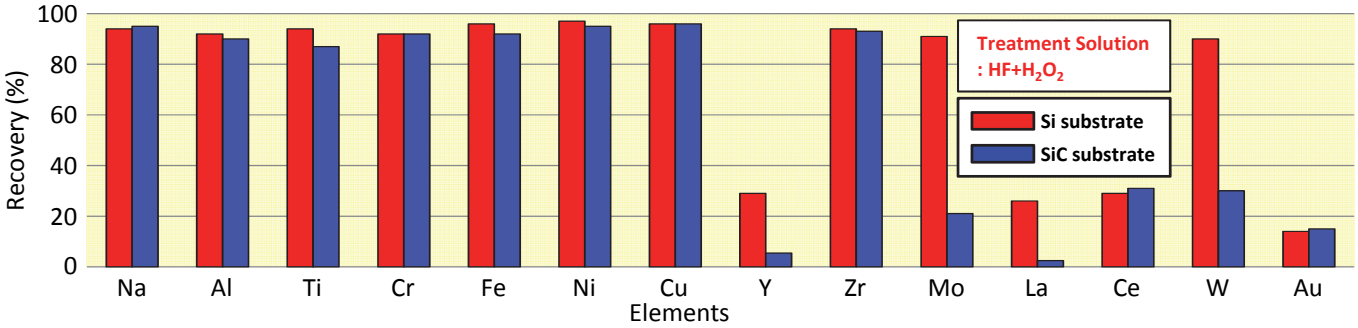

Fig.3 Recoveries of surface metal impurities.

- Na, Al, Fe that are likely to be contaminated by environment and components during processes could be analyzed accurately.
- Mo and W could be collected quantitatively from Si substrate, but in the case of SiC substrate, recoveries were comparatively low.
- Recoveries of rare earth elements (Y, La, Ce) and Au were low on both substrates.

It is difficult to analyze all elements on substrates quantitatively by only using typical preparation.

Optimization of preparation

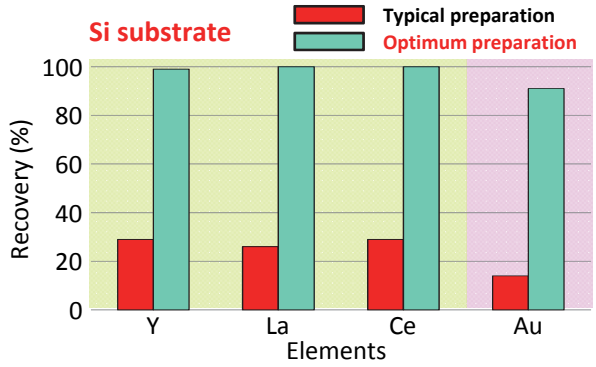

Fig.4 Recoveries of metal impurities on Si substrate.

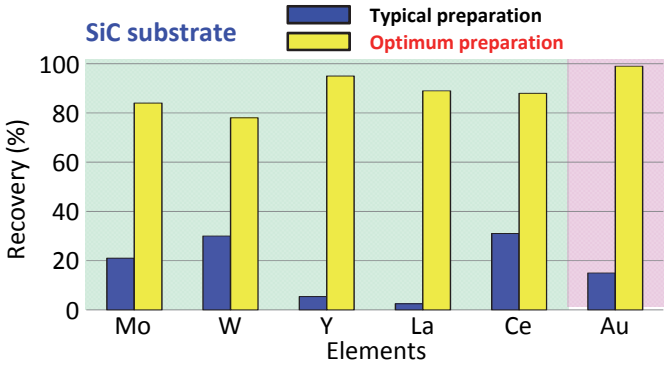

Fig.5 Recoveries of metal impurities on SiC substrate.

- Recovery of each element could be improved by applying optimum preparation.

To evaluate metal impurities on substrates accurately, it is important to understand the properties of substrates and elements.