# Identification of Contamination Using Scanning Electron Microscopy and EDX (Energy Dispersive X-rays)

## Process Contamination

Contamination can be a big problem in research/manufacturing when particles can appear buried in products and coatings affecting their final look and/or performance.

Analysing the composition of the contaminating particles can generally help in identifying the source for that particle and once that source is known, it will become easier to put measures in place to control it.

## Determining Sample Composition

Scanning electron microscopes (SEMs) can be fitted with a range of detectors to analyse different aspects of a sample. One of these detectors is the EDX (Energy Dispersive X-rays) detector. This detector provides chemical composition of a sample, including what elements are present and their concentration.
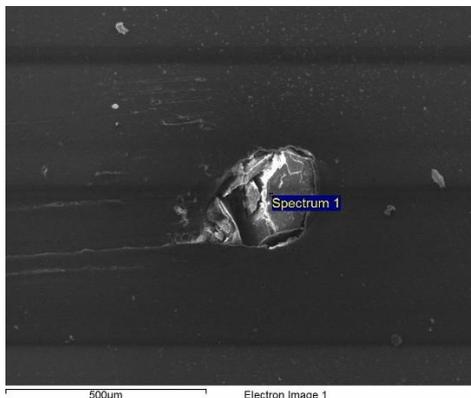


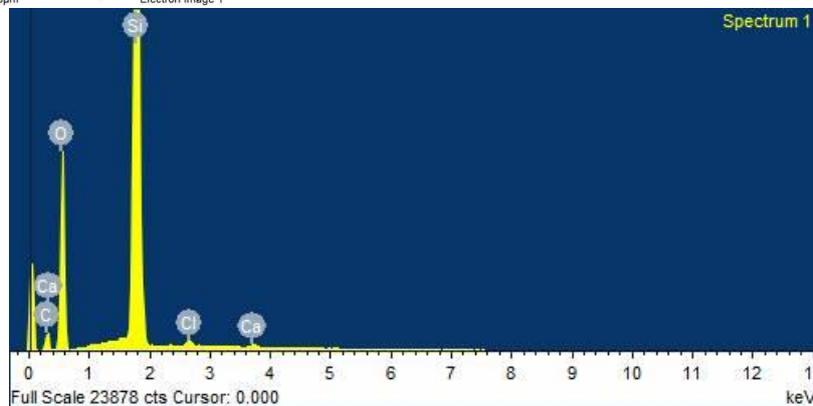| Element | Weight% | Atomic% |
|---------|---------|---------|
| C K | 15.37 | 23.37 |
| O K | 44.23 | 50.47 |
| Si K | 39.83 | 25.89 |
| Cl K | 0.34 | 0.18 |
| Ca K | 0.22 | 0.10 |
| Totals | 100.00 | |



*Figure 1: SEM/EDX analysis of a $SiO_2$ contamination particle in a polymer matrix.*

**Benefits of SEM/EDX**

The high spatial resolution of the SEM allows isolation of small contamination particles within a sample and when fitted with an EDX detector, this can generate information about the chemical composition of that particulate particle in a matter of minutes. Depending on the sample composition, this technique requires little to no sample preparation and it is not destructive, meaning that further tests can be carried out in the sample should they be required. All this makes the SEM/EDX and invaluable tool for contamination investigation.