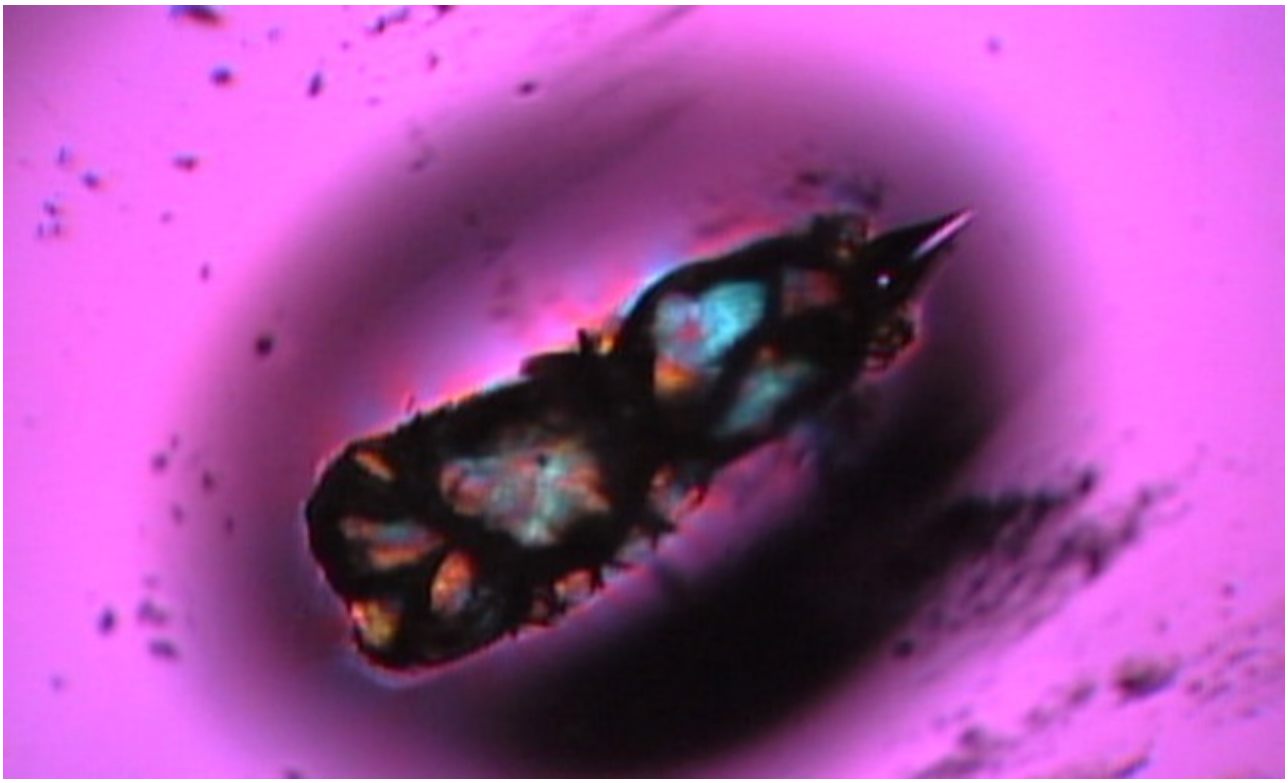
"Simple solutions are often the ones more effective"

Batch Stones: how they appear at Microscope in polarized light, a fast identification method



The Batch stones are a sort of defects they have to be recognised as soon as possible; in fact they are a very important witness of the “health” of melting and fining process, or in other words, of the back side of the glass furnace.

The typical batch stones are essentially constitued by not melted SiO2 sand grains, that due to their lower density, floats over the melt and “runs fast” to the throat. Consequently

the presence in the final product of this inclusions, could generate an high level of reject associated to decrease of process yeld (pack to pull) and increase of the scrap.

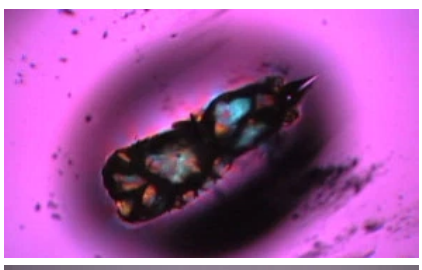
The Batch stone appears as deep white matt conglomerate, sometimes it could be glossy, other times porous and it cannot be distinguished by other types of inclusion also becoming from cracks of refractory (SiO2 or high mullite construction materials) only by observation.

To obtain a clear identification of stones nature it is necessary to perform an EDS analysis by SEM, but frequently the timing of identification are a key point to take in consideration to speed up the problem solving process and obtain an effective Non-Quality cost saving.

By the experience it is possible to recognise with reliability, this sort of stones only through a quick defect observation with petrographic microscope (microscope in polarized light).

The reasonable identification of batch stone can be performed keeping in mind:

The stone appear as deep white matt inclusion of various dimension.
The Batch stone inclusion is always sorrounded by high numbers of bubbles witness of melting process, related to degradation of raw materials (mostly carbonates and water evaporation).
The stone is included in Silica enriched glass pocket, that generate a “compression stress” visible in polarized light: pockets could be stretched by production process (as in tubular glass) becoming cords.
The Batch Stone inclusions are often associated with an increase of rough, knots and chemical cords that show a compressive stress in polarized light.



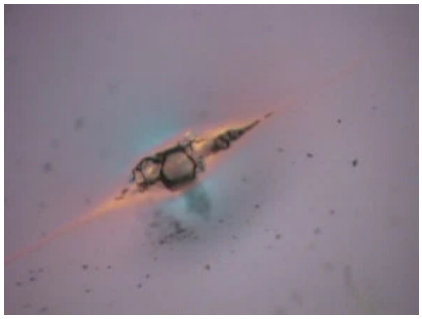


Fig1: Batch stones in polarized light

When those defects are correctly identified, the problem resolution could be reached managing a series of set points including thermal profile, bubble rates and other parameters.

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