The Challenges of Producing High Purity Quartz

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ABSTRACT

This paper describes a study on producing high purity quartz to meet the tight specification required by modern day high efficiency solar panels, lighting and fibre optics. The market specification is four and even five nines. The market for high purity silica to be used in solar panels is growing rapidly due to the growth in renewable energy applications. The processing of quartz is the key step to adding value. These unit processes include primary crushing, scrubbing. Attrition and magnetic separation, flotation and acid leaching followed by hot chlorination. The grinding of quartz requires specialist equipment because of the hardness and extreme abrasion. No increase in iron can be tolerated. Chemical refining is very effective. Critical impurities are aluminium, iron, sodium, potassium, lithium, titanium, zircon, calcium and magnesium. During the hot chlorination process at 1,200 C in a chlorine hydrogen chloride gas atmosphere. Only specialist companies can achieve this step and the danger of releasing any gas outside the vessel is very serious.

Microelectronic components are created by chemically fabricating wafers of semiconductors such as silicon to obtain the desired transport of electrical charge and control of the current. The high purity quartz market for >99.97% is a highly secretive and specialised market. High purity quartz is used to make silicon metal. Silicon metal has been designated a Strategic Mineral by the European Commission and by the US Department of justice.

This paper describes the laboratory testwork undertaken to produce a high purity quartz pre cursor material from an Australian ore source.