



European Semiconductor Industry Association

## **ESIA submission to Oko-Institute Stakeholder Consultation on Be and its compounds - RoHS Substances Study**

15 June 2018

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### 1) Usages

Beryllium Oxide, or BeO, is an insulating material used in the construction of Radio Frequency (RF) Power transistors. RF Power Transistors are critical elements in Power Amplifiers, which are used in Aerospace & Hi-Reliability Communications, Avionics & Radar, Industrial & Medical equipments.

RF Power transistors operate at very high levels of power dissipation resulting from incredibly high current density and very high temperatures therefore materials having superior thermal conductivity, high mechanical strength and coefficient of thermal expansion compatible with the semiconductor chips are needed.

### 2) Availability of alternatives

As of today, no replacement to BeO insulating material for RF Power transistors is available with the necessary equivalent properties in areas including; 3-Tesla Magnetic Resonance Imaging (3T MRI), CO2 Laser for Industrial usage, Plasma generators used in semiconductors manufacturing and Aircraft identification and navigation systems.

Beryllium has been identified by the European Commission as one of fourteen substances determined to be critical to the EU.

More importantly beryllium cannot be substituted in numerous life-saving and life-enhancing applications that provide for the safety and well-being of the general public.

Many materials have been studied as potential replacements for BeO, but the superior benefits of its properties are difficult to surmount. An example of two materials exhaustively studied to replace BeO are diamond and Aluminum Nitride. However, these and other materials have various challenges inhibiting their adoption, especially for high power RF Power semiconductor packaging.

ESIA endorses the submission provided by The Beryllium Science and Technology Association (BeST) to the RoHS stakeholder consultation. (15 June 2018)

*ESIA is an Industry Association of:*

**EECA** : European Electronic Component Manufacturers' Association

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## **About ESIA**

The European Semiconductor Industry Association (ESIA) is the voice of the Semiconductor Industry in Europe. Its mission is to represent and promote the common interests of the Europe-based semiconductor industry towards the European Institutions and stakeholders in order to ensure a sustainable business environment and foster its global competitiveness. As a provider of key enabling technologies the industry creates innovative solutions for industrial development, contributing to economic growth and responding to major societal challenges. Being ranked as the most R&D intensive sector by the European Commission, the European Semiconductor ecosystem supports approx. 200.000 jobs directly and up to 1.000.000 induced jobs in systems, applications and services in Europe. Overall, micro- and nano-electronics enable the generation of at least 10% of GDP in Europe and the world.

ESIA is an industry association under the EECA umbrella. EECA is registered in the EU Transparency Registry: 22092908193-23

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