HOERBIGER Motion Control GmbH
Bahnhofstrasse 43, 96257 Redwitz, Germany

Tel: +49 (0) 8861 221 4453
Mail: hmc.piezoproducts@hoerbiger.com

www.hoerbiger.com | www.piezoproducts.com

Interesting Facts about Piezo

The Piezo Effect

Piezo-Effect, Piezoelectric Effect,
a phenomenon discovered by J. and P. Curie in 1880 where quartz crystals become positively and negatively charged on prism surfaces when deformed by mechanical stress.
[Reference: Brockhaus]

The piezoelectric effect is the ability of certain crystalline materials to convert mechanical stress into electrical signals and vice versa. The industrially most important piezoelectric materials consist of ferroelectric polycrystalline ceramics. These piezoelectric materials possess a Perowskit crystalline structure.

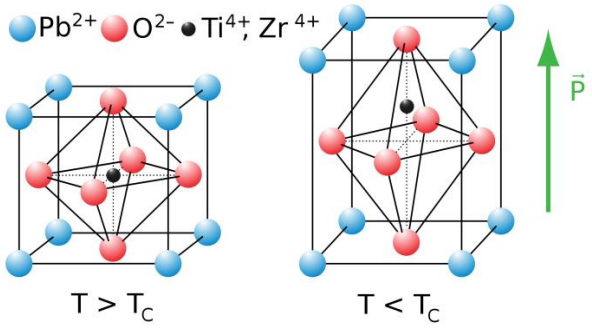

Fig. a) Fig. b)

Above a certain temperature, the so-called Curie temperature, these kinds of materials possess a cubic elementary cell (Fig. a) with a centre of symmetry. The main areas of the positive and negative charges are found in the centre of the elementary cell of the crystal. The materials are paraelectric. There is no detectable piezoelectric effect. Below the Curie temperature, the materials show a spontaneous polarization. This spontaneous polarization is caused by the displacement of ions of the elementary cell which results in the loss of the centre of symmetry (Fig. b). The main areas of the positive and negative charges are no longer to be found in the centre of the elementary cell of the crystal. The elementary cell possesses an electric dipole.

The ceramics only gain their piezoelectric properties through the polarisation process. This is achieved by exposing the ceramics to a very strong electric field.

***