

# Lead-Free Piezoelectric Ceramics: Technologies and Global Opportunities

<https://marketpublishers.com/r/LF05D363E21EEN.html>

Date: March 2022

Pages: 226

Price: US\$ 5,500.00 (Single User License)

ID: LF05D363E21EEN

## Abstracts

### Report Scope:

This report provides an updated review of lead-free piezoelectric ceramics, including materials and production processes, and identifies current and emerging applications for these products.

BCC Research delineates the current market status for lead-free piezoelectric ceramics, defines trends, and presents growth forecasts for the next five years. The LFPEC market is analyzed based on the following segments: material type, configuration, application, and region. In addition, technological issues, including key events and the latest developments, are discussed.

More specifically, the market analysis conducted by BCC Research for this report is divided into five sections.

In the first section, an introduction to the topic and a historical review of piezoelectric technology are provided, including an outline of recent events. In this section, current and emerging applications for piezoelectric materials are also identified and grouped in segments (electronics and optoelectronics, transportation, energy, industrial, instrumentation, life sciences, defense and security, and consumer products).

The second section provides a technological review of lead-free piezoelectric ceramics. This section offers a detailed description of lead-free piezoelectric materials, their properties, configurations, and typical fabrication methods. This section concludes with an analysis of the most important technological developments since 2016, including examples of significant patents recently issued or applied for. The chapter ends with a

highlight of the most active research organizations operating in this field and their activities.

The third section entails a global market analysis for lead-free piezoelectric ceramics. Global revenues (sales data in millions of dollars) are presented for each segment (material type, configuration, application, and region), with actual data referring to the years 2020 and estimates for 2021 through 2026. Dollar figures refer to sales of these products at the manufacturing level.

The analysis of current revenues for lead-free piezoelectric ceramics is followed by a detailed presentation of market growth trends, based on industry growth, technological trends, and regional trends. The third section concludes by providing projected revenues for lead-free piezoelectric ceramics within each segment, together with forecast CAGRs for the period 2020 through 2026. Projected and forecast revenue values are in constant U.S. dollars, unadjusted for inflation.

In the fourth section of the study, which covers the global industry structure, the report offers a list of the leading manufacturers of LFPECs, together with a description of their products. The analysis includes a description of the geographical distribution of these firms and an evaluation of other key industry players. Detailed company profiles of the top players are also provided.

The fifth and final section includes an analysis of recently issued U.S. patents, with a summary of patents related to LFPEC materials, fabrication methods, and applications. Patent analysis is performed by region, country, assignee, patent category, application, and material type.

Report Includes:

137 tables

An overview of the global markets for lead-free piezoelectric ceramics (PECs)

Analyses of the global market trends, with data from 2020-2021, estimates for 2022, and projections of compound annual growth rates (CAGRs) through 2026

Evaluation and forecast the global lead-free piezoelectric ceramics market size, and corresponding market share analysis by product, application, material type, end-use industry, and region

Highlights of the upcoming market opportunities and areas of focus to forecast this market into various segments and sub-segments

Review of the current market status for lead-free piezoelectric ceramic products, key technology issues, supply chain analysis, competitive scenario, R&D activities, and COVID-19 implications on the progress of this market

Discussion of lead-free piezoelectric ceramic materials and fabrication processes, analysis of the most important technological developments, and current and emerging applications of LFPECs

Insight into recent industry structure, competitive landscape of the leading manufacturers of LFPECs, product portfolios, and company value share analysis based on their segmental revenues

Description of the recently issued U.S. patents across each major category, with a summary of patents related to LFPEC materials, fabrication methods, and applications

Company profiles of the leading global players including Canon Inc., Ceram Tec, Hewlett Packard, Hitachi Metals, Intel, Panasonic, TDK Corp., and Xerox

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