



## Sonderforschungsbereich 595 Elektrische Ermüdung in Funktionswerkstoffen



TECHNISCHE  
UNIVERSITÄT  
DARMSTADT

*Sonderkolloquium  
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### **Recent Progress and Future Perspectives of Ferroelectric Materials and their Applications**

Ferroelectric ceramic components such as multilayer ceramic capacitors (MLCC), piezoelectric resonators have played important roles in advanced electronics. Size reductions of these components have allowed highly integrated functional electronic devices such as smart phones, or tablet PCs. Size reduction of an MLCC has become possible by decreasing its layer thickness. However the layer thickness decrease results in an applied electric field increase of each layer, which reaches to 100kV/mm. Materials used in the thin layer MLCC are exposed under such a harsh environment. In this regard, reliability issue of the dielectric material is one of the most important characteristics. Moreover, a thinner layer thickness leads to a lower effective dielectric permittivity. This phenomenon is called “size effect”, which inhibits higher functional integrations of MLCCs in advanced electronic devices. This paper describes current status and future trend of studies on the reliability and the size effect of ferroelectric materials used in MLCC.

On the other hand, ferroelectric ceramics have been widely used also in various electromechanical devices, such as resonator, or actuator, ultrasonic transducers, and so on. Recently healthcare application field has increased, and sensor or actuator, so-called human-machine interface devices will play important roles there. Piezoelectric materials will be a key in the healthcare technology. This paper also describes current status and future trend of piezoelectric applications including lead free issues.

Der Vortrag findet um **11:00 Uhr** im Gebäude der Materialwissenschaften,  
Lichtwiese, Petersenstr. 23, **Raum 77** statt