



# TF6100

## Lead-free thick film

InSensor® TF6100 material is a lead-free material and is based on potassium-, sodium-, niobate (KNN). Although not all properties of KNN at present are fully matching those of PZT, KNN has a competitive advantage in medical applications where lead containing substances are banned. The material is compatible with thick film technology and the properties are almost fully conserved in the change from bulk to thick film. The change in properties is mainly attributed to increased porosity in the thick film compared to the bulk material. Although InSensor® TF6100 is not yet commercially available, it can be tested upon request.

Typical applications are:

- High frequency medical imaging
- Integrated miniaturised phased array ultrasound scanners
- Implants
- Intra-body diagnostics

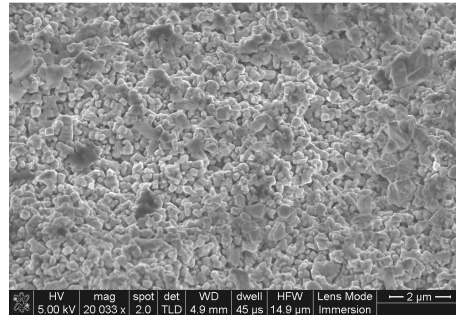


FIG. 1 SEM picture of TF6100 microstructure

| Main characteristics of TF6100                |               |                |        |
|---|---------------|----------------|--------|
|   | Symbol        | Unit           | TF6100 |
| <b>Electrical properties</b>                  |               |                |        |
| Relative dielectric constant at 1 kHz         | $K_{33}^T$    |                | 250    |
| Dielectric dissipation factor at 1 kHz        | $\tan \delta$ | $10^{-3}$      | <50    |
| <b>Electromechanical properties</b>           |               |                |        |
| Coupling coefficients                         | $k_p$         |                | -*     |
|   | $k_t$         |                | -*     |
| Piezoelectric charge coefficients (effective) | $d_{33,eff}$  | pC/N           | 80     |
|   | $d_{31}$      | pC/N           | -*     |
| Piezoelectric voltage coefficients            | $g_{33}$      | $10^{-3}$ Vm/N | -*     |
|   | $g_{31}$      |                | -*     |
| <b>Mechanical properties</b>                  |               |                |        |
| Acoustic impedance                            | $Z_a$         | MRayl          | -*     |
| Mechanical Quality Factor                     | $Q_{m,t}$     |                | -*     |

\* Under investigation