

## PHASE-PURE $\alpha$ -Al<sub>2</sub>O<sub>3</sub> (corundum) COATINGS ON METALS

- APPLICATIONS:**
- ◆ Wear-resistant coatings
  - ◆ Corrosion protection
  - ◆ Electric insulation

### Properties of hydrothermally deposited alpha alumina ( $\alpha$ -Al<sub>2</sub>O<sub>3</sub>, corundum) coatings\*

Property	Coating Type			
	Alpha Alumina	Alpha Alumina-based Composite	Custom Oxide Powders	Potassium Niobate (KNbO <sub>3</sub> )
Crystal form	100% $\alpha$ -Al <sub>2</sub> O <sub>3</sub> (corundum)	0-100% $\alpha$ -Al <sub>2</sub> O <sub>3</sub> mixed with metal oxides, boehmite, etc.	Per users specification	100% KNbO <sub>3</sub>
Type of coating	Dense, polycrystalline	Dense, polycrystalline	Polycrystalline, epitaxial, single crystal	Epitaxial, single crystal
Substrate material	Inconel 718, stainless steel 316, titanium Grade 5	Inconel 718, stainless steel 316, titanium Grade 5	Per users specification (metals, polymers, single crystal wafers)	SrTiO <sub>3</sub> (100) wafer, LiTaO <sub>3</sub> (001) wafer
Thickness	1-10 $\mu$ m	1-10 $\mu$ m	Per users specification (limited to mostly dense coatings and thickness from 10 nm to 10 $\mu$ m)	40 nm-1 $\mu$ m

\*Coatings with other purity levels and dopants may be available upon request.

Hydrothermal method is very useful to produce oxide coatings at low temperatures of 150-400°C. Sawyer's coatings are dense, uniform, and strongly adherent to the substrates. Due to the low deposition temperatures there is limited interdiffusion/reaction with the substrate and the residual stresses in the coatings are low. Sawyer's hydrothermal technology allowed for the first time deposition of phase-pure alpha alumina ( $\alpha$ -Al<sub>2</sub>O<sub>3</sub>, corundum) coatings on such metals as nickel alloys, steel, or titanium. Morphologies of these coatings and residual stress map are shown below. Sawyer's coatings can be deposited on substrates with very complex shapes, metals, polymers, and single crystal wafers.

