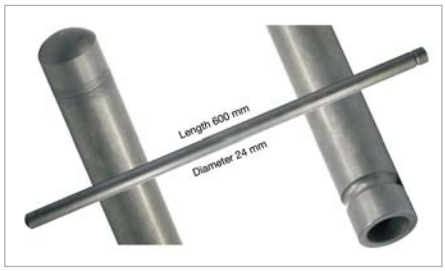
Novel titanium diboride withstands molten cryolite

ESK Ceramics GmbH & Co. KG of Kempten has succeeded in pushing the corrosion resistance of titanium diboride (TiB_2) materials quite literally to its limit. The innovation is based on a material with no grain boundary phase. This new development will offer sustainable benefits to the aluminum-producing industry. Titanium diboride by its nature already shows high hardness and toughness, combined with heat stability, thermal conductivity and excellent corrosion resistance. The material resists corrosion by a range of aggressive chemicals and molten metals, such as aluminum, which also has excellent wetting properties for TiB_2. In total, these properties make TiB_2 the ideal material for various applications in the primary aluminum production sector. A limiting factor in the industrial use of TiB_2 in Hall-Héroult cells until now has been its low resistance to the flux cryolite (Na_3AlF_6), which attacks the oxidic grain boundary phase of TiB_2. This mechanism causes grains to be displaced from the sintered structure, and ultimately leads to failure of the part. The "new titanium diboride" is to be presented under the name "EKathemisTiB$_2$" to industry experts at ALUMINIUM 2006 in Essen. It is manufactured by a special sintering technique and unlike its predecessors has no grain boundary phase. That means the material presents almost no surfaces for attack by aggressive molten cryolite. Preliminary tests have confirmed that virtually no corrosion at all at the grain boundaries can be detected. Another advantage is that the new sintering technology allows "EKathemisTiB$_2$" parts to be produced in a variety of forms to customers' wishes. The possibilities extend from plates and tubes of all sizes, to complex shapes. The combination of versatile shaping and high corrosion stability opens the door for completely novel or up to now unfeasible concepts for the production of primary aluminum. It is now possible to provide novel cathode geometries or sidewall designs, as well as continuous temperature measurement, or durable "EKathemisTiB$_2$" alternatives for fast-wearing consumables.



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