

**Title: Durable Ceramic Liner (Platform Technology/Multiple Applications).**

**Background:** Refractory materials are used in applications that involve high temperatures, pressures, and stress. The eventual failure of materials that are exposed to high temperatures, high pressure, and corrosive environments is typically due to a combination of heat weakening of the material, wearing during operation, and corrosion. Metals used in applications such as gun barrels, internal combustion engines, deep sea drilling rigs, turbochargers, superchargers, high pressure pumps, etc. are subjected to varying stresses that eventually lead to decreased strength or failure.

**Invention Description:** A ceramic coating for metal and refractories is derived from a polysilazane resin and inorganic hollow nanotubes (HNT) that significantly decrease thermal conductivity, increase toughness, increase corrosion resistance, and abrasion resistance of the coated part. The coating composition can easily be applied to a metal or refractory material substrate. Heating the coated part forms the ceramic coating on the substrate.

**Benefits and Advantages:**

Some of the key benefits and advantages of this technology include:

- Improve performance and reduce environmental impact through the elimination of chrome
- Ceramic liner that enables quick implementation with a highly practical production method
- Low cost, tough, robust, corrosion coating
- Desirable alternate coating for metals and refractory materials that is not as toxic as existing coatings and is simpler to produce.
- Improvement of wear resistance, corrosion resistance, and heat resistance of ceramic coatings for metals and refractories
- Applications such as ceramic coating for gun barrels illustrate specific product benefits such as but not limited to: improvement of service life, reduce parts consumption and failure rates, reduce field pack weight, reduce corrosion, reduction in barrel heat load, and replace chrome coating
- Environmentally friendly (especially as a chrome replacement)

**Market Potential/Applications:** This novel ceramic nanocomposite coating improves wear and corrosion resistance, provides thermal barrier performance, and replaces chrome as a protective coating on steel.

**IP Status:** Filed Canada & Europe Patent applications (**February 2013**). US Patent issued **9,150,757 (October 6, 2015)**.

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