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# Refractory Porous $Al_6Si_2O_{13}$ – $LaPO_4$ Ceramics

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## Inventors

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## Intellectual Property Status

Patent Pending


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## Background

Recent innovations in developing damage tolerance in ceramic composites have focused on three features, i.e. a porous matrix, low bonding strength coatings, and fugitive coatings that ultimately produce a gap between fiber and matrix. There is a lot of research being carried out in the field of ceramics to produce highly porous, and possess high temperature structurally stable composites.

## Invention Description

Researchers at Arizona State University have created a mechanism to produce highly porous ceramic composite with a very high degree of dimensional and chemical stability at high temperatures. This material also possesses a high degree of structural toughness relative to many other porous ceramics due to its fine texturing and mixing of the composite phases. The composite material mainly comprises of crystalline mullite and two different phases of $LaPO_4$. The technology provides a mechanism that routinely produces ceramics of up to 85% open porosity which are a result of the self foaming characteristics of the gel technology used. The ceramics are also mechanically tougher than available substrates. They also do not require a sintering aid agent.

## Potential Applications

- **Thermal Insulation**
- **Thermal barrier coating**
- **Bonding agent for fibers in thermal insulation brick**
- **Dimensionally stable catalyst substrate**

## Benefits and Advantages

- **High structural stability**
- **High Porosity**
- **Viscous sintering of matrix(no sintering aid agent needed)**
- **No shrinkage or expansion between 1000-1250 degree C**
- **Phase compatible mullite fiber**