DREXEL UNIVERSITY
Materials Science and Engineering
College of Engineering

Special Seminar
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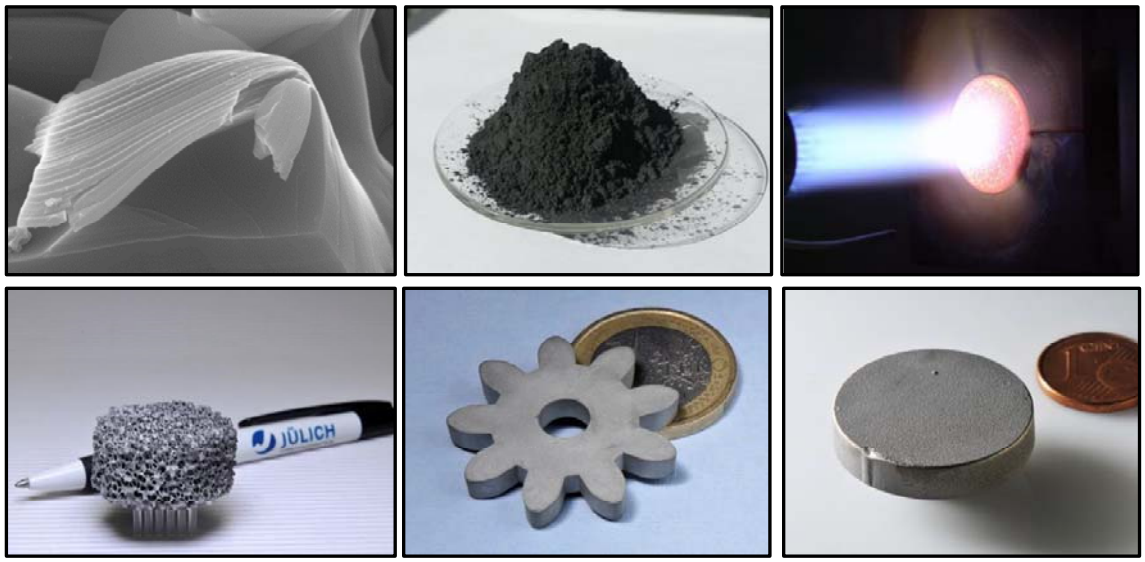
MAX phase components for high temperature applications: a fresh approach using processing

Prof. Dr. Jesus Gonzalez-Julian

Institute of Energy and Climate Research (IEK-1)
Forschungszentrum Jülich, 52425, Germany

MAX phases are a relative new family of materials with general formula of $M_{n+1}AX_n$, where M corresponds with an early transition metal, A is a A-group element, X is C and/or N, and n is typically equal to 1, 2 or 3. They are nano-layered ternary carbides and/or nitrides with high potential for high temperature applications due to their unique combination of properties, bridging the gap between ceramics and metals. However, due to the novelty of these materials, more research regarding processing and properties is required to transfer MAX phases to final applications.

In this work, synthesis of highly pure MAX phase powders using two different approaches will be presented. The control of highly pure and large contents of MAX powders allows to explore different well-known processing techniques in industry. As a result, dense, porous and ceramic matrix composites based on MAX phases will be shown, as well as coatings by spray technologies, and near net shaped components by injection molding and tape casting. Furthermore, their response at high temperature under realistic environmental conditions is evaluated, opening the possibility to transfer these promising novel materials to final real applications.