

MAX phase porous structures: new materials for high temperature applications

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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, development of porous structures based on MAX phases with different morphology will be presented in detail. First the synthesis route to obtain MAX phase powders by two methods will be shown, followed by the processing of different porous structures, which have been performed by replica method and sacrificial template, as well as more complex configurations by additive manufacturing. Finally, oxidation/corrosion resistance, and mechanical and thermal properties of these porous structures will be evaluated.

