

Final Report

Project acronym: *ALD4MAX*

Project number: *M-ERA.NET2/0012/2016*

M-ERA.NET Call 2016

Period covered: 01/09/2017 to 31/08/2021

Publishable project summary

Project ALD4MAX will tackle the deposition of MAX phases and MXenes by Atomic Layer Deposition (ALD). MAX phases are ternary carbides and nitrides with specific stoichiometry and layered structure, which show very interesting properties (electrical, mechanical, etc.). MXenes are 2D systems equivalent to graphene which are the result of the elimination of the element 'A' from the MAX phase.

So far, there is no simple approach to deposit successfully MAX phases on conventional substrates. For instance, heating at high temperatures is mandatory, which is inviable in many cases.

Moreover, MXenes are only prepared in bulk form by chemical etching of the MAX phase, but the deposition of individual MXene layers has been not reported.

In this project, we will take benefit of the layer-by-layer growth which is characteristic of ALD to deposit MAX phases and MXenes with a high degree of control. In addition, 'mixed' MAX phases will be prepared by stacking different types of MAX phases. This project will generate a high impact, since not only a new class of materials will be prepared, but also new possibilities for ALD will be proven.