AlN reinforced aluminium alloys

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It is the exceptional combination of good ductility, low density, high specific strength, wear resistance and fracture toughness that makes aluminium alloy matrix composites reinforced with ceramics particularly attractive e.g. in automotive or aerospace industry.
In this work, a high strength 7475 aluminium alloy has been chosen as a composites' matrix, while aluminium nitride ceramic particles of a different size (e.g. -325 mesh, ~1μm, submicron particles) – as its reinforcement. In all cases different amounts of ceramic phase are applied.
Powder metallurgy route, employing mechanical alloying (MA) during high energy ball milling combined with subsequent uniaxial hot pressing, has been chosen as a composites' production method, due to the fact that it allows obtaining a nanocrystalline matrix and homogeneity of ceramic particles distribution.
The microstructures investigations of produced materials are performed using X-ray diffraction measurements (XRD), optical microscopy (OM), scanning electron microscopy (SEM) and transmission electron microscopy (TEM), while mechanical properties are measured through microhardness/hardness tests and compressive tests.