In the present study [NiTiCu/AlN]/Si multilayers have been deposited on Si substrate using magnetron sputtering technique. NiTiCu/AlN multilayers were grown on Si in graded pattern with bilayer period \( n = 1, 4, 8 \) and 12 and the effect of bilayer period on surface morphology, phase transformation behaviour, mechanical and vibration damping properties were studied. The multilayers were characterized in terms of structural, morphological, mechanical and tribological properties by X-ray diffraction (XRD), atomic force microscopy, field emission scanning electron microscopy and nanoindentation. The bilayer period had great influence on the hardness, toughness and damping properties of the NiTiCu/AlN/Si multilayers. This enhancement in hardness, toughness and damping of the multilayered structure could be attributed to the different mechanisms for layer formation with nanometric thickness such as the Hall–Petch effect and the number of interfaces (fcc/hexagonal) that act as obstacles for the crack deflection and dissipation of mechanical vibrations.

**Keywords**

NiTi
Magnetron Sputtering
Shape memory
Nanoindentation
XRD