Residual Stress Induced Toughening in SiC Nanocomposite Coatings

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○ DESCRIPTION OF WORK
  ◆ Multilayered nanocomposite coatings were deposited using a hybrid process of nanoparticle impaction and chemical vapor deposition.
  ◆ Consecutive deposition of SiC and TiX layers creates a film with layers of crystalline SiC nanoparticles embedded in a crystalline SiC matrix followed by Ti/TiO₂/TiC/TiO composite layers.
  ◆ Nanoindentation was used to understand the elastic-plastic performance of the films.
  ◆ Interlayer adhesion was studied with focus ion beam milled cross sections.

○ MAJOR OBSERVATIONS
  ◆ Both layers show an increased hardness without a change in the modulus compared to coarse-grained samples.
    ■ SiC: 37.4 ± 3.0 GPa and 380.3 ± 17.2 GPa
    ■ TiX: 19.4 ± 1.5 GPa and 283.6 ± 10.0 GPa
  ◆ Interlayer delamination at TiX-SiC interface due to tensile residual stress

◆ Publications

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