Poster-Session

TiC_{1-x}:H/a-C:H nanocomposite formation by means of reactive HiPIMS

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Carbon-based nanocomposites with tunable multifunctional properties are suitable candidates for diverse fields of applications like tribology or biological, medical and energy technologies. Reactive HiPIMS is selected as a coating process with a Ti-target, an average target power of 5 kW, 50 µs pulse length, 550 µs cycle duration, working gas pressure of 0.3 Pa, 300 sccm Ar working gas flow and up to 40 sccm CH_4 reactive gas flow as well as 200°C and 400°C substrate temperatures. HiPIMS show a high ion fraction of the film-forming particles and the deposited energy by ion bombardment during film growth can be adjusted precisely. The constitution and microstructure war determined by a combination of several analytical techniques: EPMA, ERDA, Raman spectroscopy, XRD, TEM and HRTEM. It is shown that by varying the methane reactive gas flow, the following structures can be adjusted: Ti, TiC_{1-x}:H and TiC:H single layer coatings as well as TiC:H/a-C:H nanocomposites. A clear correlation is identified between the constitution and microstructure with the mechanical properties.