Ti٥١Co٣٩Si١٠ nanocomposites, with Ti٥Si٣ and Ti٣Co٢Si as the main reinforcing phases and intermetallic TiCo as a toughening matrix, were fabricated via mechanical alloying (MA) and subsequent hot pressing (HP). Monolithic TiCo and Ti٥Si٣ alloys were also designed as reference materials. The effects of MA parameters on the microstructures of the mechanically alloyed powders and sintered compacts were investigated. Three phases were produced via MA for ١٠–٣٠ h at ٢٠٠ rpm. The mechanically alloyed powders were subsequently treated via HP at ١١٠٠–١٣٠٠ °C for ٤٥–٦٠ min under ٨٠ MPa of pressure. The microstructures of the intermetallic alloys were characterized via optical microscopy, scanning electron microscopy, X-ray diffraction, and energy-dispersive X-ray spectroscopy. Dry-sliding wear behavior was evaluated at room temperature (٢٥ºC) and high temperatures (٢٠٠, ٤٠٠ and ٦٠٠ºC). The mean friction coefficient and volume wear rate gradually decreased with an increase of temperature, although the volume wear rate at ٢٠٠°C exhibited a reverse trend. The tribo-oxide layer did not exist on the worn surface at ٢٥ and ٢٠٠°C, while discontinuous thin TiN layer was observed at ٤٠٠°C. the TiN and TiO٢ layers became thick and continuous at ٦٠٠°C and it contacted with the substrate compactly. The results of the wear rate in this study are ١٠٠ times lower than recent works.

Keywords: Ti-Co-Si intermetallic, Hot press, Spark plasma sintersing