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Influence of Negative-Bias Voltage on Mechanical Properties of Quaternary Ti(Nb)C(N) Coatings[1] M.E. GOMEZ, J.C. CAICEDO, C. AMAYA, G.A. MENDOZA, J. ALVARADO-RIVERA, J. MUNOZ-SALDANA, P. PRIETO, UNIVERSIDAD DEL VALLE, COLOMBIA TEAM, UNIVERSIDAD NACIONAL DE COLOMBIA, BOGOTA TEAM, CINVESTAV, IPN, QUERETARO, MEXICO TEAM, CENM, COLOMBIA COLLABORATION — Mechanical properties of quaternary Ti-Nb-C-N films via r.f magnetron sputtering process were studied by nanoindentation. The r.f. bias voltage was systematically varied from 0, -50, -100 V, keeping all other growth parameters fixed. Active vibration modes were analyzed by using Fourier transformed infrared spectroscopy (FTIR), where bands associated to Ti-N, Nb-C-N and Ti-C-N bonds, and to Ti-Nb-C-N stretching vibrations were found. Nanoindentation results reaching the elastic-plastic behavior of the Ti-Nb-C-N films indicate that both hardness and elastic modulus increase from 22 to 30 GPa and from 220 to 306 GPa, respectively. Thus, increasing the bias-voltage from 0 to -100V a clear improvement of hardness and elastic modulus were obtained.

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