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Softening of ultra-incompressible CrN at high pressure FRANCISCO RIVADULLA, MANUEL BANOBRE, Physical Chemistry Department, University of Santiago de Compostela, 15782 Santiago de Compostela, Spain, ALBERTO PINEIRO, VICTOR PARDO, DANIEL BALDOMIR, Applied Physics Department, University of Santiago de Compostela, 15782 Santiago de Compostela, Spain, ARTURO LOPEZ-QUINTELA, Physical Chemistry Department, University of Santiago de Compostela, 15782 Santiago de Compostela, Spain, JOSE RIVAS, Applied Physics Department, University of Santiago de Compostela, 15782 Santiago de Compostela, Spain — We report a dramatic softening of CrN above 1.5 GPa, (the bulk modulus decreasing from K_0=413(20) GPa to 243(10) GPa) associated to a structural transition. From the structural and magnetic data under pressure, and ab-initio calculations we suggest that this effect is purely electronic, driven by the proximity of the ionic Cr-Cr bond to itinerant electron limit. Our results help to understand fundamental aspects of the chemical bond that gives superhard materials their superior al properties, and could be useful to preserve the mechanical properties of CrN.

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