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The Elasticity of (Fe,Ni) Alloys OWEN BOBERG, New Mexico, BORIS KIEFER — The Earth's core is the most remote part of the interior of our planet. Astronomical and cosmochemical evidence suggest that the composition of the core is dominated by an iron-rich (Fe_{1-x},Ni_x) alloy that likely contains at least one light element. At ambient conditions Fe adopts a bcc structure and undergoes a phase transition to hcp at high pressure (P $>\sim$13 GPa). However, the stable phase in the presence of nickel and/or light element(s) at inner core pressures (P$\sim$3.7 million atmospheres) is much less certain. Using *state-of-the-art* density-functional-theory calculations we determined the effects of Ni concentration on the elasticity and stability of FeNi alloys. We find that hcp derived FeNi alloys are stable at 0K, at least for 3.1 at%, 6.2 at%, and 12.5 at% nickel content, which encompasses the expected nickel content in the Earth's core ($\sim$5-10 at%). Furthermore we find that the bcc structure is least stable. This is in contrast to recent work that finds that bcc derived FeNi is stable. We will discuss possible reasons for this difference and its implications for core chemistry and structure.

Owen Boberg
New Mexico

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