Stability of dense liquid carbon dioxide\textsuperscript{1} BRIAN BOATES, Lawrence Livermore National Laboratory, Dalhousie University, AMANUEL TEWELDEBERHAN, Lawrence Livermore National Laboratory, STANIMIR BONEV, Lawrence Livermore National Laboratory, Dalhousie University — We have used first-principles molecular dynamics to identify a transition from molecular liquid CO\textsubscript{2} to a new polymeric liquid phase under compression. The phase transition is first-order and unlike other such transitions, is not accompanied by metallization. The region near the liquid-liquid-solid triple point is particularly interesting as it coincides with pressure-temperature conditions inside the Earth’s mantle. We have characterized the stability of CO\textsubscript{2} under these conditions; contrary to previous studies, our calculations show that CO\textsubscript{2} does not phase separate into carbon and oxygen. Comparisons with and alternative interpretations of previous measurements will be presented. Routes for experimental detection of our predictions will also be discussed.

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