

Abstract Submitted  
for the DPP13 Meeting of  
The American Physical Society

**Quantum molecular dynamics simulation of the formation of warm dense SiH<sub>4</sub>** JIAYU DAI, HUAYANG SUN, JIANMIN YUAN, DONG-DONG KANG, ZENGXIU ZHAO, National University of Defense Technology — The ionic and electronic structures of warm dense silane (SiH<sub>4</sub>) for four densities of 1.795, 2.260, 3.382 and 3.844 g/cm<sup>3</sup> are studied using quantum molecular dynamics at the temperatures (T) from 1000 K to 3 eV. All the structures melt above 1000 K. The melted states from 1000 K to 4000 K are best characterized as polymeric, and they will convert to dense plasma states at 1 eV. At the polymeric state region, the two low density cases of 1.795, 2.260 g/cm<sup>3</sup> dissociate and transform to polymeric state via chain states from the initial structures, which is different from those of the higher densities. The present characters can help us to understand how the warm dense matter forms. A rise in conductivity is found when T < 1000 K, indicating the nonmetal-to-metal transition. The conductivity decreased slightly when the temperature becomes higher. The formation of warm dense plasma can be characterized as the procedure: firstly, melting from solid phases; secondly, forming polymeric states with large clusters; finally, forming warm dense plasma with dynamic clusters.

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Date submitted: 09 Sep 2013

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