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Formation of superconducting platinum hydride under pressure: an ab initio approach DUCK YOUNG KIM, Geophysical laboratory, Carnegie institution of Washington , RALPH SCHEICHER, Uppsala University, Uppsala, Sweden , CHRIS PICKARD, University College London, London, UK, RICHARD NEEDS, University of Cambridge, Cambridge, UK, RAJEEV AHUJA, Uppsala University, Uppsala, Sweden — Noble metals such as Pt, Au, or Re are commonly used for electrodes and gaskets in diamond anvil cells for high-pressure research because they are expected to rarely undergo structural transformation and possess simple equation of states. Specifically Pt has been used widely for high-pressure experiments and has been considered to resist hydride formation under pressure. Pressure-induced reactions of metals with hydrogen are in fact quite likely because hydrogen atoms can occupy interstitial positions in the metal lattice, which can lead to unexpected effects in experiments. In our study, PRL 107 117002 (2011), we investigated crystal structures using *ab initio* random structure searching (AIRSS) and predicted the formation of platinum mono-hydride above 22 GPa and superconductivity T_c was estimated to be 10 – 25 K above around 80 GPa. Furthermore, we showed that the formation of fcc noble metal hydrides under pressure is common and examined the possibility of superconductivity in these materials.

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