Electronic Supplementary Material (ESI) for Inorganic Chemistry Frontiers.

Supporting Information

Gd-doped diamond synthesized by Gd@C_{82} under high pressure and high temperature

Shuhang Liu, [a,b] Jun Han,[b,d] RongLi Cui, [c] Xin Yang,[b] Yunfan Fei,[b] Xingyu Tang,[b] Yida Wang,[b] Yajie Wang,[b] Yongjin Chen,[b] Jiajia Feng,[b] Haiyan Zheng,[b] Kuo Li, [*b] and Xiaoyang Liu[*a]

[a]State Key Laboratory of Inorganic Synthesis and Preparative Chemistry, College of Chemistry, Jilin University, Changchun 130012, China.

[b]Center for High Pressure Science and Technology Advanced Research (HPSTAR) Beijing 100094, China.

[c]Institute of High Energy Physics, Chinese Academy of Sciences, 100049 Beijing, China.

[d]Department of Physics, Southern University of Science and Technology, Shenzhen 518055, China.

Corresponding Author:

[*]Email: liuxy@jlu.edu.cn

[*]Email: likuo@hpstar.ac.cn

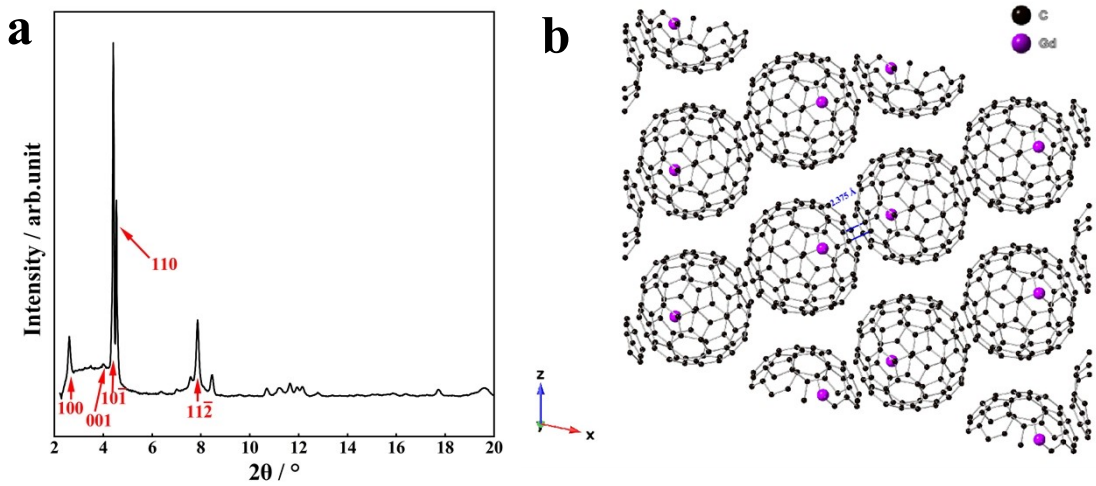

Figure. S1. (a)XRD of the polycrystalline Gd@C_{82} raw material at ambient pressure. (b) We constructed the crystal structure of Gd@C_{82} with a monoclinic lattice with a =15.83 Å b =11.15 Å c =10.50 Å , beta=101.83° and a $P2_1$ space group at ambient conditions, referring the literature

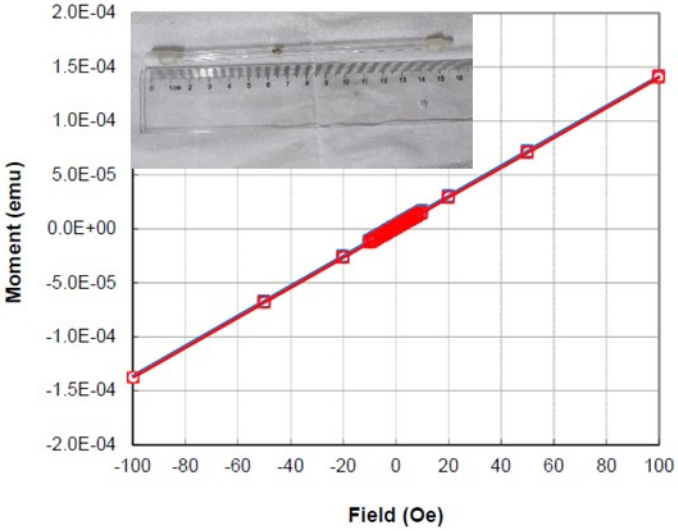

Figure. S2. The standard palladium in the sample cavity and its M-H curve. the magnetic moment calibrations for MPM3 after every cool down based on the formula: $\mu = \chi \cdot H \cdot m$, where μ is the magnetic moment of the sample, χ is the mass susceptibility of palladium at 298 K (5.25×10^{-6} emu/Oe-g), H is the magnetic field applied, and m is the mass of the palladium sample

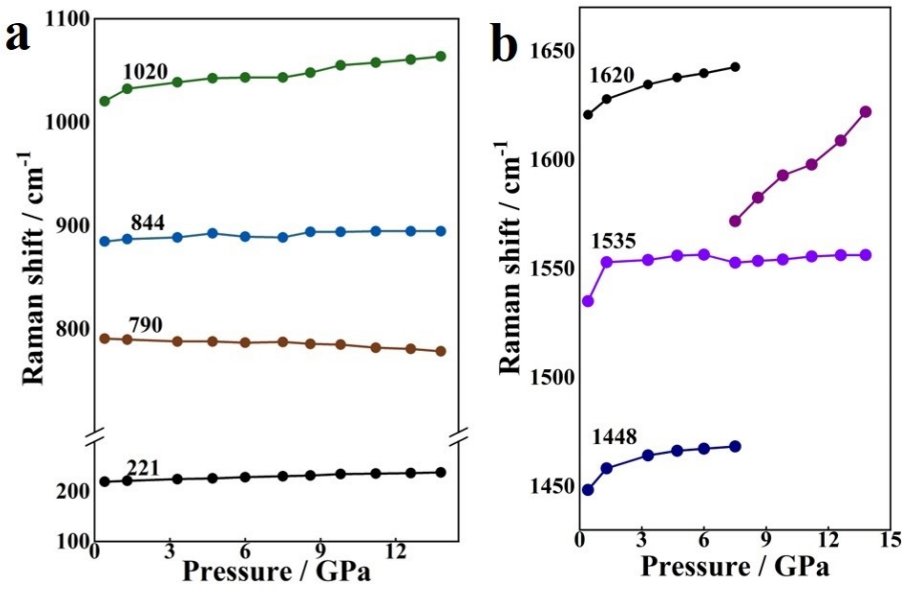

Figure. S3. peak move of Raman spectra (a) 0-1100cm^{-1} (b) 1400-1700cm^{-1}

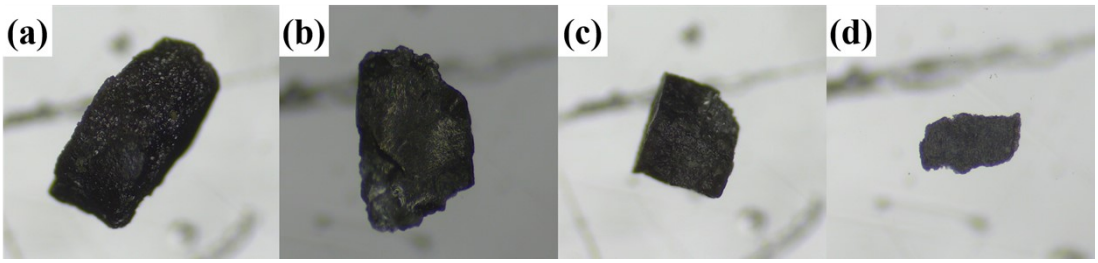

Figure. S4. The images of typical doped diamond sample (a) 15 GPa 1800 ℃. (b)22 GPa 1800 ℃. (c)22 GPa 2000 ℃. (d)22 GPa 2100 ℃.

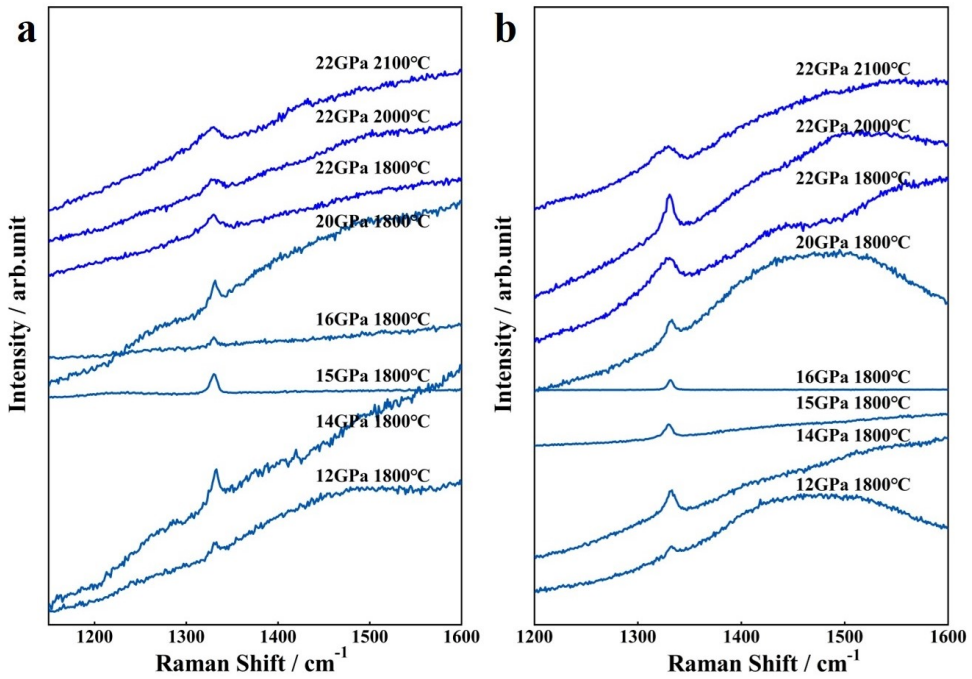

Figure. S5. Raman spectra of samples recovered from different pressure and different temperature (a) 488 nm laser and (b) 532 nm laser.

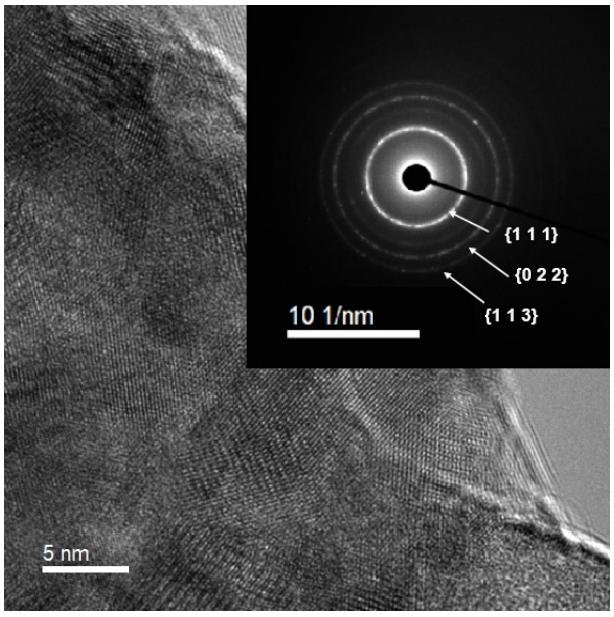

Figure. S6. HRTEM and selected area electron diffraction images of the Gd-doped diamond recovered from 15 GPa and 1800 ℃.

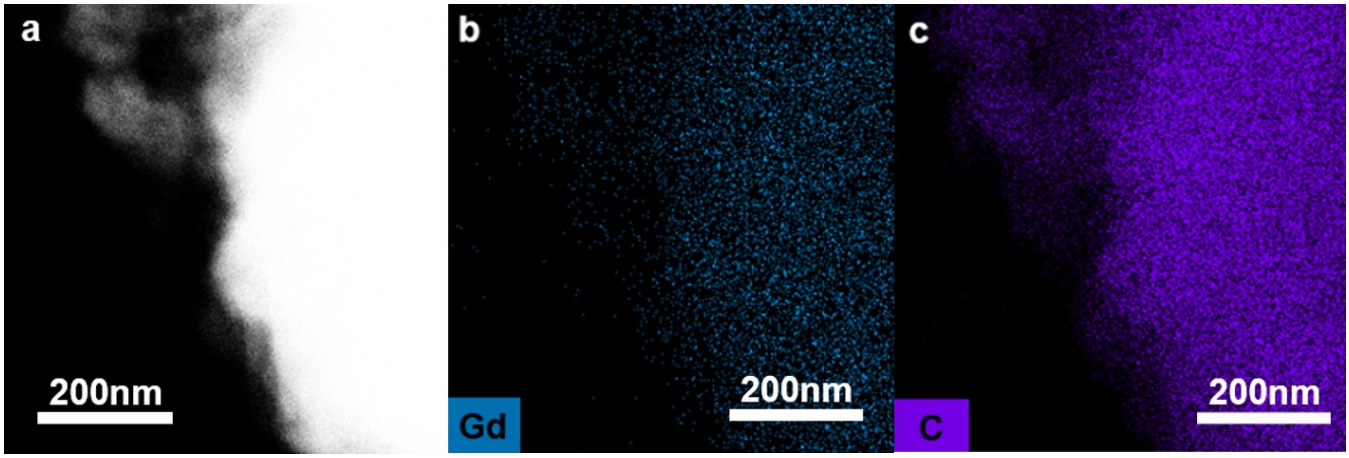

Figure. S7. (a) High angle annular dark-field scanning transmission electron microscopy STEM image of Gd@C_{82}. (b) Distribution of Gadolinium element of figure a obtained by EDS elemental mapping. (c) Distribution of carbon element of figure a.

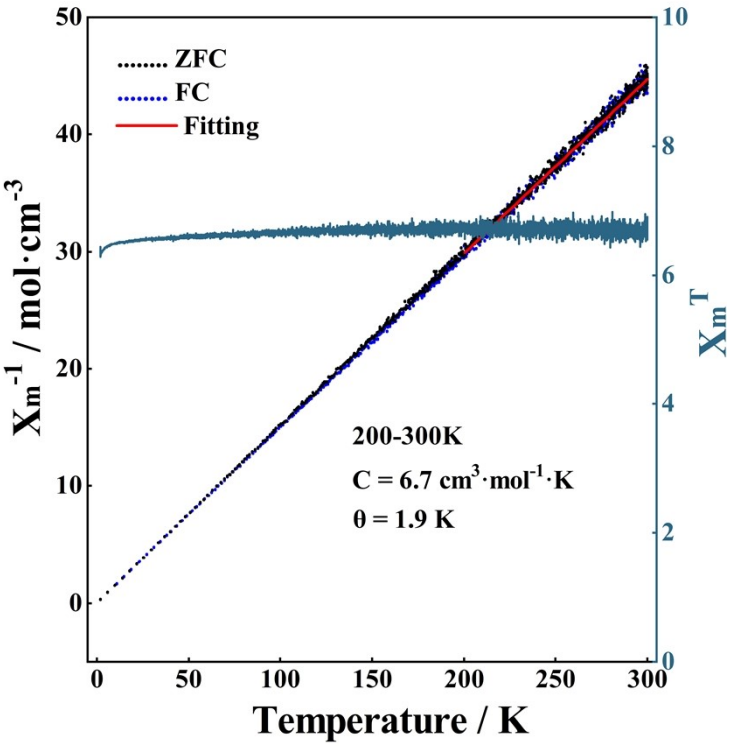

Figure. S8. M-T curve of raw material Gd@C_{82}.