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## Technical improvements on Paris-Edinburgh high-pressure cell for neutron diffraction

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Neutron is a complementary probe to X-ray for material sciences in determining crystal structures. In particular, neutron diffraction is powerful to locate hydrogen positions in hydrogen-bearing compounds. The spallation neutron source of new generation is now being constructed in Tokai, Ibaraki Pref. as a part of the J-PARC facility.

In the history of high-pressure neutron science, the most crucial technical progresses would be the developments and uses of Paris-Edinburgh (P-E) presses in strong neutron sources in European countries and US. In order to use practically a P-E press in J-PARC for the future, it is necessary to improve these conventional techniques for achieving higher pressure with larger sample volume. We especially redesigned the parts of anvils and gaskets surrounding samples targeting over 15 GPa with 10 mm<sup>3</sup> of initial sample volume. Toroidal anvils were prepared from Ni-bonded WC made by Fuji Die Co., Ltd. A composite gasket was made from Al alloy and pyrophyllite. Recently, high-pressure generation have been tested several times using Bi as a pressure calibrant. In-situ and high-quality X-ray diffraction experiments were also carried out using synchrotron radiation at PF-AR, KEK, with NaCl pellets and Au foil as pressure calibrants. The sample volume was 10 mm<sup>3</sup> and the highest pressure obtained was above 11 GPa. Our study indicates that some important improvements were produced by the development of new cell assemblies. Furthermore, the required improvements and future prospects to the technique will be proposed.

Keywords: Paris-Edinburgh cell, high pressure, neutron diffraction, hydrous minerals, J-PARC