Black injection vein occures in Ushikubi fault system, central Japan

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Recent few years, many researchers reported existence of chemical and physical agents and dynamic or static strength decrease process on the fault surface. In this study, we researched on the Ushikubi fault system, located along the boundary between Toyama and Gifu prefectures, northern central Japan. The fault-related rocks occuring along the Ushikubi fault characteristically contains black-colored fine matrix. According to XRD and TEM-EDS analyses of this black-colored material, the graphite and low crystallizad carbon were detected. Moreover, pseudotachylyte-like black injection vein existing in the ancient stage fault rocks which is lacking in the black-colored matrix. On the other hand, fault gouge and fault breccia which are rich in black-colored matrix showing fluxion texture remarkably. Result of SEM-EDS analysis and EDS elemental mapping, black matrix of pseudotachylyte-like injection vein contains carbon, and also found the evidence of thermal decomposition in the calcite of the side wall(protolith). In the injection vein, precipitation zone like a chilled margin exists, and its occurrence suggest that those precipitation zone deposited from high temperature fluid. In addition, no evidence was found that existed molten material. It's thinkable that generation reaction of carbon occured, because protolith doesn't include so many graphite and carbonaceous material. According to fault gases observation, H_2, He, CH_4, CO_2 gases were ditected on Atotsugawa, Ushikubi fault damage zone(Shimada et al., 2005; Satake and Hayashi, 1983). So it's quite possible that chemical reaction describing below occurs.

[CO_2+2H_2=C+2H_2O], [$CaCO_3$+2H_2=C+2H_2O+CaO], [CO_2+CH_4=2C+2H_2O]

We think that this chemical reaction activated by coseismic thermal heating, and it can regard as fault related carbon-fixation reaction(Graphitic Fault Mineralization).