Small-scale shear zones preferentially developed along quartz veins -examples in Teshima Island, Seto Inland Sea, SW Japan-

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Mylonitization preferentially developed along pre-existing brittle fractures within host rocks have been reported as nucleation of ductile shear zones. One of the models is plastic deformation promoted by hydrolytic softening following the infiltration of fluids along fractures (Segall and Simpson, 1986). For example, Pennacchioni (2005) has reported that small-scale shear zones have been nucleated along pre-existed quartz veins that formed along brittle fractures in the host adamello tonalites. In Teshima Island, Seto Inland Sea, small-scale shear zones in both older and younger Ryoke granite have been reported (Hara et al., 1992). The occurrence of small-scale shear zones in Teshima Island is significant to discuss the mechanism of strain localization, kinematic history and paleo-stress field in the Ryoke belt.

Large-scale sinistral mylonite zone in the Ryoke belt is observed from Chubu to Kinki region, however, its western extension is indistinct because of weak deformation.

Ryoke granite in Teshima Island has undergone weak ductile deformation throughout the area. Foliation of deformed Ryoke granite strikes ENE-WSW and dips nearly-vertical, showing sinistral sense of shear. Small-scale shear zones are recognized in the south of the island. These shear zones strike WNW-ESE and dip sub vertical. Thus they are oblique to the foliation of the older Ryoke granite. ESE-plunging (10-20 degrees) lineation and asymmetric structures within the small-scale shear zones show dextral sense of shear. Width of small-scale shear zones ranges from several centimeters to several meters. The center of the shear zone is strongly mylonitized. Then foliation of host rocks near small-scale shear zones converges on the foliation of shear zones.

Some of the small-scale shear zones are accompanied with quartz veins along their center. These quartz veins are always strongly mylonitized. Quartz in the veins is very fine (grain size; 15-30 micrometers) due to dynamic recrystallization, and its shape preferred fabric is prominent. Grain size of recrystallized quartz in the host rocks decreases up to 250-40 micrometers toward the quartz vein.

These observations suggest that the formation of quartz veins predated dextral ductile shear. Plastic deformation was probably accelerated by hydrolytic softening following quartz vein generation along brittle fractures in host rocks. A series of these deformations is considered to have occurred under cataclastic-plastic transition zone.