

# **Microstructures of Major Fault Zones within Taiwan**

## **Chelungpu Fault System**

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### **Abstract**

For the determination of the slip weakening mechanism during the 1999 Chi-Chi earthquake, we observed the three major fault zones in the Chelungpu fault system meso- and microscopically. We found two newly shear zones within the shallower fault zone as candidates of slip zones at the earthquake. The shear zone were composed of an abundant fine-grained matrix supporting rounded to subangular lithic fragments, and exhibited fragmentations of mineral particles and particle size reductions, characterized as cataclastic textures. Their particle size distributions were fractal, and the dimensions were both 3.07, which might result from small average particle sizes and high degrees of comminution. The probabilities of fragmented counterparts in the shear zones were nearly zero, indicating that the zones have been in a mechanically fluidized. Because of no evidence of pseudotachylyte and clay injection in and around the shear zones, frictional melting and elasto-hydrodynamic lubrication were not likely to have occurred at the earthquake. Instead, we proposed that comminution and particles fly have occurred simultaneously, corresponding to mechanical fluidization or thermal pressurization.