

Etch pits on garnet crystals and their geological significance

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Chemical etching was studied on seven faces/sections, i.e., (100), (110), (111), (120), (211), (221) and (hkl) of garnet crystals from Xinjiang by use of 40% HF (reagent grade) at room temperature. AFM (Atomic Force Microscopy) and DIC (Differential Interference Contrast Microscope) were the analytical methods used. Etch figures formed on the seven typical faces/sections were different in each case (Fig. 1). Combining with the prolonged and shortened direction of each etch pit, we assume that the cell parameters influence the etch figure to some extent. Meanwhile, the etch figure symmetry shows the point group $m\bar{3}m$ of garnet. Measured by clear distribution of etch pit in DIC 200 \times and specific shape in DIC 400 \times , the reaction rate of the seven surfaces was (111) > (221) > (100) > (hkl) > (120) > (110) > (211).

Based on the etched random grain section indices identified in typical etch figures, the crystallographic preferred orientation of garnet grains in eclogites from Bixiling and Shuanghe, Dabieshan district, was defined as having strong maxima of [110] subnormal to the foliation and strong maxima of [211] subparallel to the lineation. These observations point to specific geotectonic events that affected the eclogites in the two localities.

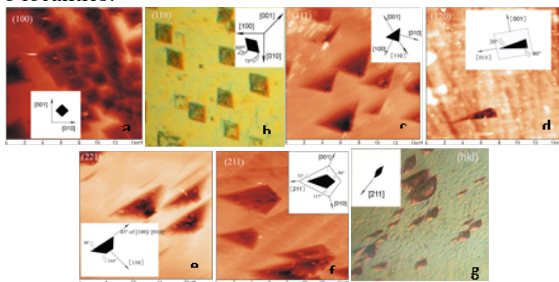


Fig 1: Etch figures formed on two faces and five sections of garnet (observed by AFM, except for b and g by DIC): (a): on (100); (b): on (110); (c): on (111); (d): on (120); (e): on (221); (f): on (211); (g): on (hkl).