

Brittle Origins for Disseminated Gold Mineralization in Mylonite: Gaocun Gold Deposit, Hetai Goldfield, Guangdong Province, South China

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Abstract

Gold mineralization in the Hetai goldfield in South China is almost entirely confined to a series of steeply dipping ductile shear zones generated during Hercynian-Indosinian orogenesis of Sinian host rocks. Approximately half of the mineralization is in the form of disseminations in the mylonite and the remainder was clearly emplaced as a result of brittle deformation in veinlets and as sulfide cement to brecciated mesoscopic quartz veins. Heavily influenced by the presence of disseminated mineralization, all publications on Hetai determine a major role for ductile deformation in the introduction of gold into the deposit. The brittle deformation is typically regarded as redistributing, within the host structures, the gold initially introduced as a result of ductile deformation mechanisms. However, textures of the sulfides associated with the gold indicate an entirely postductile deformation timing as they display none of the features attributed to ductile deformation. During the evident brittle deformation phase, competence contrasts at the microscopic scale allowed fracturing to focus on the quartz-sericite domain boundaries of the mylonite foliation, thus permitting the introduction of auriferous fluid into the mylonite to create disseminated mineralization. The control exerted by preexisting structures is further reflected in the restriction of disseminated mineralization to the quartz domains, presumably because the sericite domains accommodated the deformation in a more distributed fashion.

Several other lines of evidence support an origin of the Hetai deposit in an upper crustal regime. A similar style of disseminated mineralization, to that seen in the mylonite, surrounds microveinlet terminations in the brecciated quartz veins, as well as overprinting pseudotachylite, which is associated with cataclasite. There are also large volumes of unmineralized mylonite indicating no connection between the intensity of strain and gold grade. We conclude that, in structurally controlled deposits, the textural category of disseminated gold mineralization can be generated either under entirely ductile or entirely brittle conditions, and that microtextural evidence has to be carefully analyzed to determine the mode of formation of a deposit.