
Silver-bearing alkali feldspars in experiment – and in nature?

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Most naturally occurring feldspars have compositions close to the fundamental K-Na-Ca plane, but other cations, such as Rb, Cs, Pb, Ba, Sr, and Ag, can extensively substitute for the alkali and alkali earth elements in the feldspar structure. Published low-temperature (ca. 300 °C) ion-exchange experiments have produced pure end-member silver feldspar ($\text{AgAlSi}_3\text{O}_8$) from a natural sanidine starting material. New high-temperature (600 ± 50 °C) synthetic granite melts can crystallize magmatic feldspars with a wide range of compositions ($\text{K}_{0.06-0.88}\text{Na}_{0.07-0.88}\text{Ag}_{0.0-0.46}$), showing the familiar miscibility gap between the potassium-rich and sodium-rich end-members, and much lower maximum of Ag in the K-rich feldspars ($\sim\text{Ag}_{0.20}$) compared with the Na-rich feldspars ($\sim\text{Ag}_{0.46}$). The ability of alkali feldspar to accommodate Ag cations in its structure potentially makes it an indicator mineral wherever it occurs as a coexisting gangue mineral (e.g., albite, cleavelandite, adularia) in epithermal silver mineral deposits. If so, coexisting feldspars from epithermal silver deposits, such as in the Freiberg District of the eastern Erzgebirge in Germany, the El Barqueno District in Mexico, the Comstock Lode in Nevada, and the Debert Lake prospect in the eastern Cobequid Highlands, now require re-investigation to assess their potential as indicator minerals, even though their silver concentrations may not exceed the parts-per-billion level.