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## **Petrography of Ankerite Cement, Grain Replacement, and Fracture Fill in Foreland Sandstones of the Central Rocky Mountains**

Ferroan dolomite and ankerite (here referred to as ankerite) are widespread late diagenetic precipitates in both sandstones and carbonate rocks in a variety of basinal settings. In foreland basins of the central Rocky Mountains, in rocks ranging in age from Cambrian to Cretaceous, ankerite is sufficiently abundant locally to exert significant control on both matrix and fracture porosity in oil and gas reservoirs. Thus, deciphering the controls on the emplacement of this mineral is interesting from a practical standpoint.

Ankerite in these rocks, similar to other volumetrically important authigenic minerals, manifests a spatial distribution at small scales that reflects a difficulty with nucleation. Within sandstones, ankerite post-dates quartz cementation and is widely observed, at the scale of a few micrometers, to be localized either as overgrowths on detrital dolomite grains in sandstones or as replacement of detrital K-feldspar. Detrital dolomite cores are observed to contain abundant intragranular fractures, confirming that ankerite precipitation post-dates at least a portion of the compaction in these rocks. Spatial affiliation with dissolving detrital K-feldspar suggests a possible microscale pH control on precipitation. Controls on ankerite precipitation in fracture porosity are not evident, but elemental compositions of cements, grain replacements, and fracture fills show similar ranges of variation, suggesting that these different petrographic forms of ankerite precipitated from the same fluids and record a common history of fluid/rock interaction.