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# 地質学セミナー

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## GEOLOGY AND GENESIS OF IRISH-TYPE DEPOSITS IN IRELAND

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The Irish Midlands host one of the world's major zinc orefields. The Irish zinc deposits occur in a transgressive sequence of Lower Carboniferous marine carbonate rocks lying above a wedge of Upper Devonian continental red beds. The Irish deposits share the following features:

- (1) They occur preferentially in the stratigraphically lowest, non-argillaceous carbonate unit.
- (2) They occur along, or immediately adjacent to, normal faults which formed conduits for ascending hydrothermal fluids.
- (3) Sphalerite and galena are the principal sulfides. Iron sulfides occur in variable amounts; some deposits are dominated by iron sulfides while others contain very minor amounts. Barite is present in all the deposits, ranging from a dominant phase to a minor constituent. Many deposits contain minor tennantite, chalcopyrite, and/or Pb-Cu-Ag-As sulfosalt minerals.
- (4) They are stratabound and many display large-scale stratiform morphologies.
- (5) They display complex sulfide textures ranging from replacement of host rock by fine-grained, anhedral and colloform sulfides to infill of solution cavities by fine-grained, colloform and medium- to coarse-grained crystalline sulfides. Layered sulfide textures, other than colloform banding, are restricted to geopetal cavity fillings.
- (6) They formed from the mixing of metal-bearing, moderately saline, slightly acidic, relatively sulfur-poor fluids with relatively sulfur-rich fluids that appear to have been derived from

Carboniferous seawater.

The Irish orefield is regionally zoned. Copper and silver are most common in deposits located within the southern portion of the country. Pre-mineralization dolomitization is also largely restricted to southern deposits. The age of mineralization is known with certainty only for the Navan deposit, which formed several million years after deposition of its host sediments; geologic relationships suggest that the other Irish deposits formed at approximately the same time as the Navan deposit. This period is marked in the Irish Midlands by the establishment of a complex facies mosaic consisting of fault-controlled carbonate basins and high-standing platforms indicating an extensional tectonic environment. Extension was relatively modest and was related to continental collision (the Hercynian Orogeny) occurring to the south of Ireland.

Fluid inclusion studies indicate that the hydrothermal fluid had temperatures of between 150 and

240°C and salinities of between 10 and 23 weight percent NaCl equivalent when it reached the sites of sulfide precipitation. Limited fluid inclusion data suggests that the water pulled into the system from above was significantly cooler (<120°C). Sulfide precipitation occurred as the metal-rich, sulfur-poor, mildly acidic hydrothermal fluids reacted with carbonate sediments causing an increase in fluid pH. Sulfur isotope studies indicate that sulfide precipitation was increased due to the mixing of hydrothermal fluids with the cooler, sulfate-rich water.

The host rocks and mineral textures of the Irish deposits are similar to many Mississippi Valley-type deposits. They differ, however, in having a metal suite that includes more copper, silver, and iron than most MVTs and in containing extensive zones of truly massive, often highly iron sulfide-rich, sulfide. These differences are probably the result of higher hydrothermal fluid temperatures, which allowed higher metal contents in the fluids and increased reactivity.

