

DEVELOPMENT OF EXPLORATION TOOLS USING MORPHOLOGY AND ALLOY COMPOSITION OF ALLUVIAL GOLD: A CASE STUDY FROM DISTRICT NOWSHERA, KHYBER PAKHTUNKHWA, PAKISTAN

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Abstract

Alluvial gold is abundantly available in Quaternary deposits in the vicinity of River Kabul and River Indus in the district Nowshera, Khyber Pakhtunkhwa Pakistan. Alluvial gold is being mined at small scale from Gilgit, Chilas, Besham to Attock along River Indus. The morphology and alloy composition of gold grains in alluvial environment have greater exploration impact and will help to develop new techniques specifically for source identification. Gold grains from the panned concentrate samples were collected and detailed morphological features and the alloy composition was studied using SEM-EDS in the University of Peshawar and Electron Microprobe at the University of Leeds, UK. The studied morphological features of gold grains include roundness, folding, flattening, surface textures and outline. High value of the flatness index of the gold grains along with other morphological features suggests that these have been transported to a greater distance from their sources. Chemical analyses of 58 gold grains were performed using electron microprobe in order to get information about the sources and hence the provenance. Significant correlation is found between Ag vs Cu ($> 0.4\%$) for Shaidu, Akora Khattak and River Kabul. The ternary plots Au-(Ag x 10)-(Cu x 100) show that gold from Shaidu, Akora Khattak and River Kabul give indication of gold to be derived from various mineral deposit types. River Indus and Kabul in the vicinity of study area are the main carrier of alluvial gold and deposited in the quaternary deposits of district Nowshera at suitable locations.