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Sulfuration Resistance of Five Experimental Ag-Pd-Au-Cu Alloys with Low Pd Content of 10 or 12%

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Abstract:
Commercial Ag-based alloy (46Ag-20Pd-12Au-20Cu alloy) is widely used in Japan as a casting alloy. As opposed to the commercial composition, we prepared five experimental Ag-based alloys with reduced Pd content of 10 or 12%, increased Au content of 20 to 30%, and reduced Cu content of 12 to 20%. We then evaluated their sulfuration resistance by analyzing cast specimen surfaces dipped in 0.1% Na_2S solution with SEM/ EPMA, TF-XRD, and XPS. It became evident that all alloys were susceptible to sulfuration in the segregated Ag-rich Pd-poor phases. The degree and speed of sulfuration, however, differed among the six alloys examined. In particular, one experimental alloy (46Ag-10Pd-30Au-12Cu) possessed a sulfuration resistance equal or superior to that of commercial Ag-based alloy, while the other four experimental alloys were inferior in sulfuration resistance. Based on the results of this study, we concluded that our newly developed 46Ag-10Pd-30Au-12Cu alloy could be employed as a new sulfuration-resistant Ag-based casting alloy - which is especially useful if the price of Pd is skyrocketing again.

Key words:
Ag-Pd-Au-Cu alloys, Low Pd content, Sulfuration resistance

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