Photolysis of AgHal Single Crystals After Modification of Surface

L. A. Novikova and L. V. Kolesnikov
Kemerovo State University, Russia

Introduction

As a know, the changing of ionic balance in solution lead to the modification of specific surface. It is displayed in the changing of specific surface and the concentration of lowcoordination Br^- ions on the surface and the ions conductivity. Inasmuch as the photolysis is a surface process the studying of silver allocation particularities after modification of AgHal crystals surface by photographically active substances is interest. In this paper the investigations of Ag-particles allocation particularities were made in pure and alloy samples. The Ag-particles allocate on the crystals surface as a result of photolysis.

Experiment

The crystals of AgHal were grown in solution of hydroxide ammonia by slowly evaporation ammonia. The diameter of crystals was 1-2 $X10^{-3}$m. The different habite crystals AgCl and AgBr without impurity and with additions Ni^{+2}, Cu^{+2}, Cd^{+2} were grew. Under the expose the surface of crystals were subjected to modification in solutions KBr with pBr=1; 3; 7 in the during 120 mines and also in solutions KCNS with concentration 1%, 2%, 5% in the during 30-120 mines. The expose carried out by mercury lamp in the during 15 mines. The structure of crystals surface and distribution of silver photolitic particles is investigated by transmission electron microscopy method. The samples were prepared by carbon replic procedure.

Results

As a result experiments were found that in the time of expose of AgCl(Ni) and AgCl(Cu) crystals the allocation photolitic silver particles is observed on the surface in the appearance jams of separate particles which haven't a habite. It is showed in figure 1.

This size is varied in limit from 2×10^{-7} to 8×10^{-7}m. The number and size of Ag-clasters on plane (100) is significantly smaller then on the adjoining plane (111). The increases of size quadrangular terraces were observed under the increase of pBr. Under the modification of AgCl(Cu) crystals surface, the microcristallites with (100)- plane appeared on the plane (111) and parallel steps appeared on (100)-plane of crystals in directions [100]. See figure 2. The smaller number photolitic silver particles were found on surface of AgCl(Cd) crystals. It is coordinate with dates on of ions conductivity and the decrease of aninterchangeability effect. Under the expose of pure AgCl crystals the jams small photolitic silver particles were sow on the crystals plane by size 4×10^{-8} - $1{,}4 \times 10^{-7}$m. The large number jams smaller around Ag-particles by size $6 \times 10^{-8} - 2 \times 10^{-7}$m were sow on the crystal surface of rombododecaedral habite with (110)-plane after expose. It covered considerable part of the crystals surface (See figure 3).

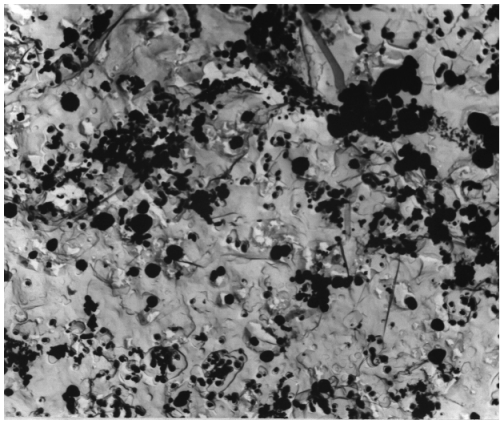

Figure 1. The allocation of photolytic silver particles on surface AgCl(Ni) – crystals.

Figure 2. Topography of allocation of photolytic silver particles on the adjoining (100) and (111) planes of AgCl(Cu) crystals.

As a result the alloying of AgCl crystals by ions of Ni^{+2}, Cu^{+2} and modification in abundance of Br^{-} ions lead to the increase of silver photolitic particles number in the field of jams and to the its size increase.

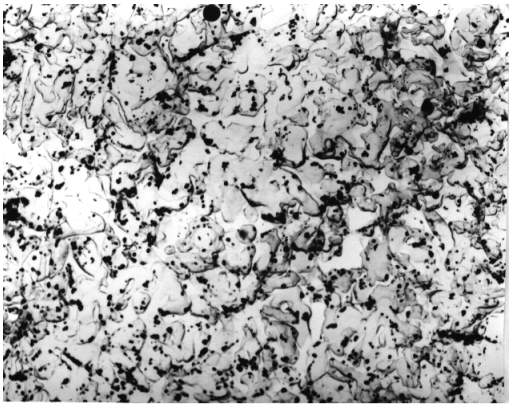

Figure 3. Topography of allocation of photolytic silver particles on the surface of AgBr crystals. The plane is (110).

Under the modification by KCNS solutions the crystallites growth is observed on the surface of cubooctaedral AgBr crystals. Its size increase in the during modification to 120 mines and also its found the different habite. The jams photolitic silver particles are founded on the surface crystals AgBr under expose in the different steps of modification. The size of Ag-particles is changed in limit from $2 \times 10^{-7} - 4 \times 10^{-7}$m. In the several cases Ag-particles have the hexagonal. As a result the structure of crystals surface is determined by conditions their obtaining. The number of silver concentration centers is changed depending on the habite and the type of addition impurity. The increase of number concentration centers is result from an interchangeability effect in the crystals with {111}-planes which have high concentration of interstytual silver ions in the nearsurface layer and the high concentration of low coordinate Br^{-} ions on surface. In case of surface mature and presence of dislocations exits and blocks borders the primary formation of discrete silver particles is observed in field their defects.