

# On the physical properties of new antimony glass system

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Current glasses are based on complex silicates, borates and phosphates that ensure a good chemical durability and stability against devitrification. Exotic glasses free of classical glass formers are less frequent and often require special processing. They exhibit specific properties that may be attractive both for fundamental purposes and for potential applications. This is the case of Heavy Metal Oxide Glasses (HMOG) that have been the subject of numerous studies [1–3]. Among these glasses, glass forming ability of antimony sesquioxide  $Sb_2O_3$  has been predicted and confirmed by several authors. Large amounts of  $Sb_2O_3$  could be incorporated in silicates and phosphate glasses. In addition, antimonite glasses free of classic vitrifiers appear attractive for their extended infrared transmission range, their large refractive index and their non-linear optical properties.

This work is centred upon new chloro-antimonite glasses associating antimony oxide, lead and silver halides on ternary glasses in the  $Sb_2O_3$ - $PbCl_2$ - $AgCl$  ternary system. Lead oxide was selected for the vitrification and silver oxide as an infrared transmissive optical component.

The glass forming area in this system was drawn at Fig. 1. The limits of the vitreous domain correspond to small spheres, roughly 1 mm in diameter. Larger and thicker samples could be obtained for the non-limiting composition. Antimony oxide was the main component while  $PbCl_2$  concentration does not exceed 40 mol % and maximum  $AgCl$  content is less than 30 mol %. Note that no binary glass was observed in the  $Sb_2O_3$ - $AgCl$  system. The vitreous state was assessed by visual inspection and confirmed by thermal analysis. Samples of several millimeters in thickness were prepared for optical and mechanical measurements. It appears that the most stable compositions correspond to the 20% molar concentration of lead chloride.

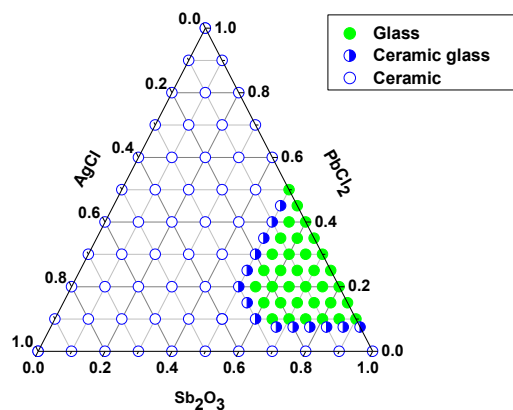


Figure1. Compositional limits for glass formation in  $Sb_2O_3$ - $PbCl_2$ - $AgCl$  system

## References

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