The Role of GeO2 in the Glass-Ceramic Formation and Microstructure of Sodium Phosphate-Molybdate Glasses

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Homogeneous glasses and class-ceramics can be produced by molten glass and converting it into a fine-grained ceramic by an appropriate heat treatment. Generally, wide range of glass-ceramic properties can be modified in a predictable way by changing the composition with a suitable heat treatment. The final crystalline phases depend on the composition of the glass and the heating methods. Thus, the properties of glass-ceramics are determined by the heating and annealing procedure during synthesis of glasses and their microstructures, which depend on the composition of the parent glass as well as the thermal treatment.

The peculiarities of the glasses formation based on the P_2O_5–MoO_3–GeO_2–Na_2O system have been investigated for GeO_2 content from 5 to 30 % mol of GeO_2 and from 5 to 30 % mol MoO_3. The base glass composition has been modified by partial replacement of P_2O_5 for GeO_2. The effect of the compositional variation on the glassy areas and crystallization products of the glasses and the type of the solid solution phases formed as well as the resulting microstructure have been traced by differential thermal analysis (DTA), powder X-ray diffraction analysis (XRD) and scanning electron microscopy(SEM).

The objective of the present work is to understand the role of the glass oxide constituents in determining the type of the crystalline phases formed, their solid solution formed and the microstructure of the resultant glass-ceramic materials.

Type of presence

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