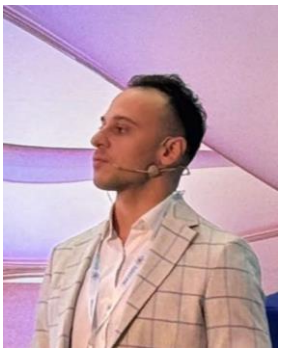
Session	Materials Science in Glass (II)
Date	APRIL 11, 2025
Time (CET)	10:20 - 10:35
Chair	Osman Burak Okan



Thin Glass Composition Design Study for Float Furnaces

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Biography

Ateş Gösterişlioğlu is working as specialist in Advanced Glass and Melting Technologies under Innovation Directorate of Şişecam R&D. He has been contributing research projects especially on kinetics and energetics of melting, raw materials, glass compositions, glass properties and development innovative glasses. He holds MSc degree in Materials Science and Engineering and his PhD works ongoing in Yıldız Technical University.

Abstract

Thin glasses (<1mm) are gaining attention for numerous industrial flat glass applications such as laminated windshield for automobiles where lightweighting and high mechanical strength are sought together. Although the increase in demand for thin glasses is mainly originating from the market pull, another strong motivational push for thinner glasses arises with the global decarbonization targets. Reducing the plate thickness for the main applications will eventually minimize the production volume and decrease the emissions and energy consumption, thus make a great contribution for achieving sustainable future for the glass industry. Hence, increasing mechanical strength of thin glasses has great importance in terms of expanding their usage area and converting them to high added value products. Composition design and optimization in SiO_2-Al_2O_3-R_2O-RO-(B_2O_3) system can enable production of thinner and durable flat glass plates to be further strengthened via chemical strengthening process later on. In this study, care was given to design glass compositions that will meet both processing demands and performance expectations. Glass compositions are designed by both conventional method and utilizing AI&ML tools, in parallel with structural feature predictions such as NBO/T, Vm and APD. Designed glasses sythesized by melt-quench and structural characterization techniques were employed such as Raman, FTIR and NMR. Thin glass slides obtained by grinding and polishing (t:~0,75mm) and tested for thermal properties, surface and bulk mechanical performance. Surface compressive stress profile after strengthening were evaluated and correlated with compositional modifications. This work shows that manipulation of glass structure by compositional alterations leads significant imrovements for chemical strengthening and mechanical performance that will enable thin float glasses used in various applications.