

#GPD2017

ALL EYES
ON GLASS.

GLASS PERFORMANCE DAYS 2017
JUNE 28 - 30, 2017. TAMPERE, FINLAND



WORKSHOP

GLASS CHEMICAL STRENGTHENING BY ION EXCHANGE

SUMMARY

Part One – Fundamentals of Ion Exchange for glass strengthening: the workshop will be initially addressed to glass strength issues and to the strategies to increase glass strength by the introduction of residual stress. Fundamentals of ion exchange from a scientific perspective will be focused with the purpose to understand how residual stresses are generated and how they can be predicted by mathematical models. Relaxation effects relevant to glass strengthening by ion exchange will be discussed and introduced.

Part Two – Ion Exchange process conditions and technological issues: the second part of the workshop will be more related to process conditions and, initially, it will be discussed the relevance of glass chemical composition and of molten salt bath contamination to the glass strengthening final results. Technological aspects related to process and plants implementations and process control will be finally introduced and discussed.

Methodological note – Each topic indicated in the “Key Point summary” and in the “Workshop timetable” will be initially introduced and outlined by the organizer with a presentation, the discussion for each argument will be opened to the workshop participants. Exercises and case studies will be proposed and discussed by the organizer.

KEY POINTS

- Basic of glass strength issues
- Strengthening by introduction of residual stresses
- Physics and chemistry of ion exchange
- Residual stress profile resulting from ion exchange
- Relaxation effects
- Relevance of glass chemical composition (Soda Lime, alkali aluminosilicate)
- Relevance of ion source (molten salts) contaminations
- Technological issues (Plants and implementations)
- Process control

TIMETABLE

09:00	Speaker and participants' introduction
09:15	Part one – Glass strength issues and glass strengthening by introduction of residual stresses
10: 00	Part one – Physics and chemistry of ion exchange: residual stress profile build-up by ion exchange
11:00	Part one – Relaxation effects
12:00	Lunch break
13:00	Part two - Relevance of glass chemical compositions and ion sources contaminations
14:00	Part two – Technological issues: plants and implementations
15:00	Part two – Process control
16:00	Discussion and conclusion
17:00	End of the workshop

Duration: 8 hours



ORGANISER

Guglielmo Macrelli, Isoclima SpA

Guglielmo Macrelli is a senior scientist at Isoclima SpA - R&D Department. He has a background in physics and chemistry. He has been active since 1990 in many glass science areas: ion exchange in silicate glasses, thin film optical coatings and glass mechanical properties. He has a long time (more than 25 years) experience in research and development and plant production control for chemical strengthening of silicate glasses by ion exchange. He has an extended experience in laboratory testing and measuring for glass strength and residual stress in glass and he authored a number of scientific papers and conference presentations. He organized workshops on this topic in the past two editions of GPD (2013, 2015). Guglielmo Macrelli participates to standardization drafting groups in both ISO and ASTM and he is member of the American Ceramic Society.