

Introduction to Glass Properties – Lectures/Laboratories

- Introduction to Glass
 - Definition of Glass
 - Glass Transformation Region/ASTM E1356 Glass Transition Temperatures by DSC
- Kinetic Theory of Glass Formation
 - Nucleation Rate
 - Crystal Growth Rate
 - T–T–T Diagram/ASTM E794 Melting and Crystallization Temperatures by DTA/ASTM C829 Liquidus Temperature
- Structure of Glass
 - Random Network Theory
 - Bond Strength Criterion
 - Elements of Structural Models
 - Chemical Compositions
- Phase Separation
 - Thermodynamics
 - Mechanisms
 - Phase Diagrams
- Density
 - Definition
 - Composition Effects
 - Thermal History Effects
 - Measurement Techniques/ASTM C604 True Specific Gravity
- Viscosity
 - Definition
 - Viscoelasticity
 - Temperature Dependence
 - Composition / Temperature Effects
 - Thermal History Effects
 - Measurement Techniques/ASTM C336 Annealing and Strain Point/ASTM C598 Annealing and Strain Point/ASTM C338 Softening Point/ASTM C1350 Viscosity by Beam Bending/ASTM C965 Viscosity of Molten Glass
- Thermal Expansion
 - Definition
 - Composition Effects
 - Thermal History Effects
 - Thermal Stresses
 - Measurement Techniques/ASTM E228 Thermal Linear Expansion/Contraction
- Heat Capacity
 - Definition
 - Temperature Dependence
 - Composition Effects
 - Measurement Techniques/ASTM E1269 Heat Capacity by DSC

- Thermal Conductivity
 - Definition
 - Phonon Conductivity
 - Photon Conductivity
 - Temperature Dependence
 - Composition Effects
 - Measurement Techniques/ASTM E1461 Thermal Conductivity by Laser Flash
- Elasticity
 - Definition
 - Atomistic Approach
 - Temperature Dependence
 - Composition Effects
 - Measurement Techniques/ASTM E494 Ultrasonic Velocity in Materials/ASTM C1259 Young's Modulus
- Strength
 - Definition
 - Theoretical Strength
 - Practical Strength
 - Fracture Mechanics
 - Fatigue
 - Slow Crack Growth
 - Fractographic Analysis
 - Fracture Statistics
 - Strengthening of Glass
 - Thermal Shock
 - Measurement Techniques/ASTM C158 Flexural Strength/ASTM C1499 Equibiaxial Flexural Strength/ASTM 1525 Thermal Shock Resistance
- Electric Conductivity
 - Definition
 - Ionic Conductivity
 - Temperature Dependence
 - Composition Effects
 - Thermal History Effects
 - Measurement Techniques/ASTM C657 Electrical Resistivity