**Ruleset for the Spring Meeting 2026 Glass Strengthening Competition**

## 1. Overview

The Glass Strengthening Competition is a hands-on technical challenge that combines creativity, materials engineering, and real-world strengthening strategies. Participants will receive identical glass sheets approximately two months before the Spring Meeting and will compete by applying any strengthening/treatment method of their choice. Final samples will be tested on-site using a standardized ball-drop impact setup to determine the team with the strongest glass sheet.

## 2. Eligibility

- Open to all students, researchers, and professionals from academia and research institutes attending the Spring Meeting.
- Participants may compete as **individuals** or in **teams of up to four** members.
- A single institution may have **multiple teams and/or individual participants**.

## 3. Registration & Materials Distribution

- Registration opens on Feb. 2 and closes **February 25, 2026**.
- Each registered competitor/team will receive **six identical glass sheets*** by **March 15, 2026***:
- **Five sheets** for experimentation, optimization, and mechanical testing prior to the conference.
- **One sheet** as the **final test sample** to be **brought to the Spring Meeting** for the official competition.
- *Competitors can receive their supplies earlier than March 15th if they sign up early

** Float sodalime-silicate (SLS) glass sheet size would be ~75*50 mm with a thickness of ~6 mm. This may be modified based on final considerations.

**NOTE:** While we will do our best to provide high-quality samples, we cannot guarantee that the glass sheets will be free of pre-existing flaws from the supplier or from normal handling. Our goal in providing multiple samples is to allow each team to inspect them, identify any visible imperfections, and select the best possible specimen for the competition. The remaining sheets can then be used for experimentation and testing.

## 4. Allowed Treatments

Participants may apply **any chemical, thermal, or mechanical strengthening approach**, including but not limited to:

- Ion exchange
- Heat treatment/annealing/thermal tempering
- Thin-film deposition (non-hazardous materials only)
- Dipping, spraying, sol-gel, or similar methods that meet the requirements
- A combination of approaches

### 4.1 Coating Thickness Limit

- In the case of applying any coating, and any other treatment, the overall thickness of the sample must not exceed 6.15 mm (+0.05 mm considered as the uncertainty), meaning that if the measured thickness of the sample is >6.20 mm, the sample will be disqualified. .
- Thickness will be measured at the event using digital calipers/micrometers (±0.01 mm accuracy). In addition, participants are required to provide evidence of their coating thickness in case they use a coating as their strengthening approach.
- The **final sample must remain transparent**, with no visible opacity blocking observation through the sheet. The transparency will be tested at the event. As long as our determined text can be read by putting the glass on top of it, the sample would be qualified, which means that decreasing the transparency would be allowed to the point that the text is readable.

## 5. Prohibited Materials & Practices

For safety and fairness, participants **may NOT**:

- Any treatment, including applying a coating, heat treatment, crystallization, etc., which results in a reduction in transparency beyond the allowable limit described above in section 4.1.
- Use coatings or treatments thicker than the allowed limit.
- Use materials classified as hazardous or requiring special handling not suitable for the event venue.
- Embed foreign objects or reinforcements (e.g., fibers, meshes, adhesives exceeding the thickness limit, or any off-the-shelf tapes and coatings)
- Modify the dimensions of the glass sheet beyond surface treatment (no cutting or changing thickness).

## 6. Required Technical Summary and research abstract

Each competitor/team must submit two written summaries:

### A. Initial Technical Summary (at Registration)

A **technical summary/abstract** (500-word maximum) must be submitted at the time of registration. This document should outline the proposed strengthening approach and will be reviewed and approved by the organizing committee to confirm eligibility and participation in the competition. Participants are not required to strictly adhere to their initially proposed approach. Modifications or changes to the strengthening strategy during experimentation are permitted, provided that all treatments comply with the competition requirements and prohibitions.

### B. Final Research Summary & Presentation (at Check-In)

At the conference check-in, each competitor/team must submit a final summary as an extended research abstract and a 2-3 minute brief presentation (presented live or as a pre-recorded video by the team members) that includes:

- The final treatment method(s) used, with clarification of any changes from the originally proposed approach. Changes are allowed as long as they meet the requirements and prohibitions.
- Experimental data collected from the five practice samples (optional images may be included)
- Key observations, challenges encountered, and scientific reasoning supporting the chosen approach
- The expected strengthening mechanism
- Any changes from the original proposal

These documents will be maintained as an educational archive and will help track the development of strengthening strategies across future competitions.

## 7. Day-of-Competition Procedure

1. Participants check in and submit:
    - Their team name
    - Their **final test sheet**
    - The **one-page technical summary/abstract**
    - **1-2 minutes for each team to introduce their team and present their approach**
        - Can be based on the one-page technical summary/abstract
        - Also provide team introduction and team name, background
2. Event staff verifies:
    - Sample dimensions and thickness compliance
    - Transparency requirement
3. Samples are tested **one at a time** using a standardized ball-drop setup:
    - Samples consist of a 2” X 3” X ¼” (75 mm*50 mm*6 mm) sheet of glass, that are strengthened according to the method from the team
    - A steel ball (45.5 g and 7/8" diameter) is dropped from increasing heights in the range of (25-200 cm) onto the sample.
    - Participants can choose at which height they want to enter/start the competition based on the available heights/steps on the test setup.
    - Failure is defined as **any substantial crack (observable with the naked eye) or complete fracture**.
4. The **maximum height** survived without failure is recorded as the performance metric.
5. In the event of a tie, tie breaker rules under section 8.4 will be implemented.

## 8. Detailed Competition and Scoring Rules

### 8.1. Objective

The winner is the team whose glass sample survives the **highest ball-drop height without failure**.

### 8.2. Test Procedure

- Each team selects a drop height as their entry.
- Tests are performed **from the lowest height to the highest**.
- All teams must participate in the **first round** (you may choose a conservative or aggressive starting height).

### 8.3. Multi-Round Progression

- After each round, teams may:
    - Submit a **new (higher) drop height**, or
    - **Skip a round** and observe other results.
- Any new height must be **at least 5 cm higher** than the team's previous successful height.

### 8.4. Determining the Winner

The winner is determined based on the following criteria:

**Primary Criterion**

1. **Highest survived drop height (no failure)**

**Tie-Breaking Rules**

If two or more teams reach the same maximum height:

2. **Number of attempts**: the team with **more attempts** is ranked higher

If still tied:

3. **Failure (break) intensity**, ranked as:
    - Cracking (preferred)
    - Shattering (less preferred)
    - If both samples shatter → the sample with the **largest intact remaining piece** wins

### 8.5. Maximum Height Limitation

- The maximum drop height is **2 meters**.
- If one or more samples survive **2 m**:
    - A **larger steel ball** will be used.
    - If samples still do not fail:
        - The result will be considered a **tie**, and tie-breaking rules will be applied.

**Notes**

- Teams are encouraged to **strategize their height selection** carefully.
- Skipping rounds may be used as a **strategic advantage**.

**Prizes (Proposed)**

- **1st Place:** $500 + merch/prize item + certificate
- **2nd Place:** $300 + merch/prize item + certificate
- **3rd Place:** $200 + merch/prize item + certificate

(Prize amounts may be adjusted depending on the final budget.)

**9. Safety Requirements**

Safety is mandatory for all participants and spectators:

- All participants and staff must wear **safety glasses**.
- The ball-drop test must occur inside a **transparent safety box**.
- Only designated event staff may operate the testing apparatus.
- Broken glass must be cleaned using the **provided broom/vacuum** and disposed of in labeled bins.

**10. Provided Equipment and Materials**

Organizers will supply:

- Standardized glass sheets (distributed before the event)
- Ball-drop setup (tube, steel ball, acrylic/plexy safety shield box, base tile/plate)
- Digital calipers/micrometers
- Measuring tape and Ladder
- Safety glasses and gloves
- Broom/vacuum
- Score sheets and signage
- Waste containers for broken glass

Participants bring **only their final treated sample**; no additional tools or chemicals are allowed on-site.

**11. Timeline Summary**

- **February 25, 2026:** Registration deadline
- **February 27, 2026:** Confirmation of final accepted groups
- **Week of March 2, 2026:** Glass sheets shipped to participants

- **12-16 April 2026 (Spring Meeting):** On-site competition (at the poster session or TBD)

## 12. Ethical and Professional Conduct

- All work on the samples must be conducted by the registered team members.
- Any evidence of rule violation or unreported reinforcement will result in disqualification.
- Judges' decisions are final.