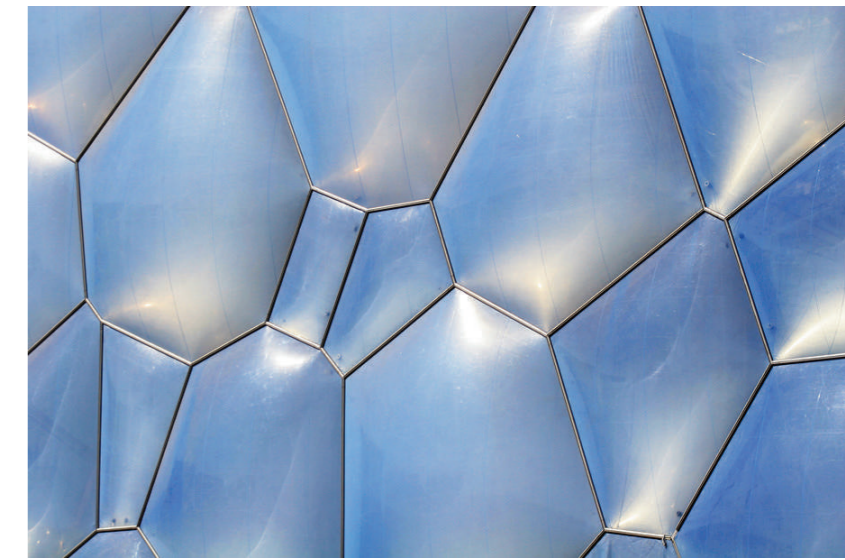
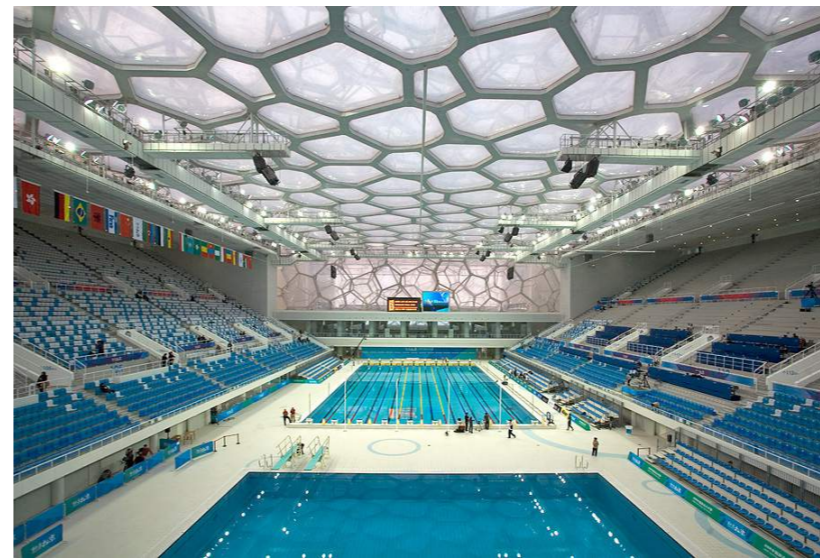


**One-to-one**  
*Lightest Facade*

Elizabeth Low  
 TS Materials Term 2

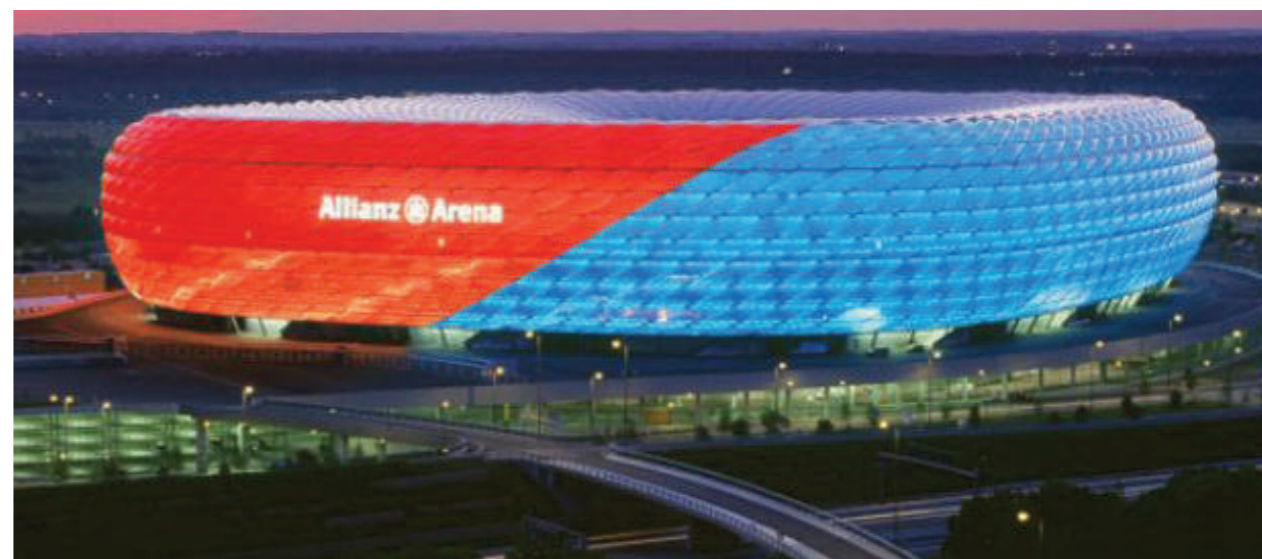
**PRECEDENCE**  
 BUILDING: National Aquatics Center (Water Cube)  
 LOCATION: Beijing, China  
 ARCHITECT: PTW Architects  
 ENGINEER: ARUP

- Facade constructure from ETFE (ethyl tetrafluoroethylene), which has 1% the weight of glass and is a better thermal insulator.
- The building's distinctive appearance inspired by soap bubbles. (0.2mm thickness)
- Around 20% of solar energy is trapped with the ETFE facade and used for heating.



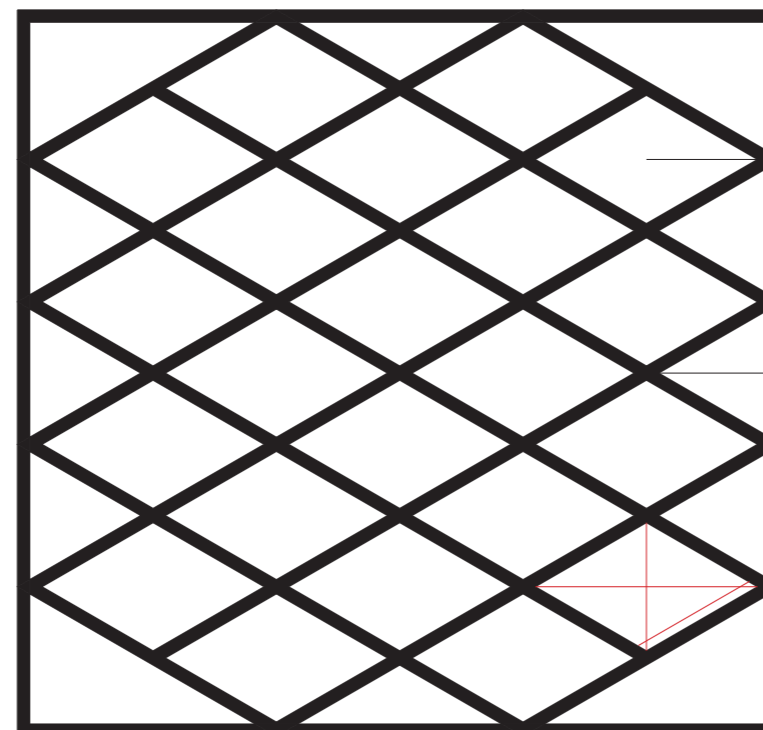
**PRECEDENCE**  
 BUILDING: Allianz Arena  
 LOCATION: Munich, Germany  
 ARCHITECT: Herzog & de Meuron Architects  
 ENGINEER: ARUP

- A colour-changing facade that reflects the club using the arena.
- Structural frame of the bowl and stands are made of reinforced concrete while the roof consists of steel latticework.
- The entire building is wrapped in illuminated air cushions.



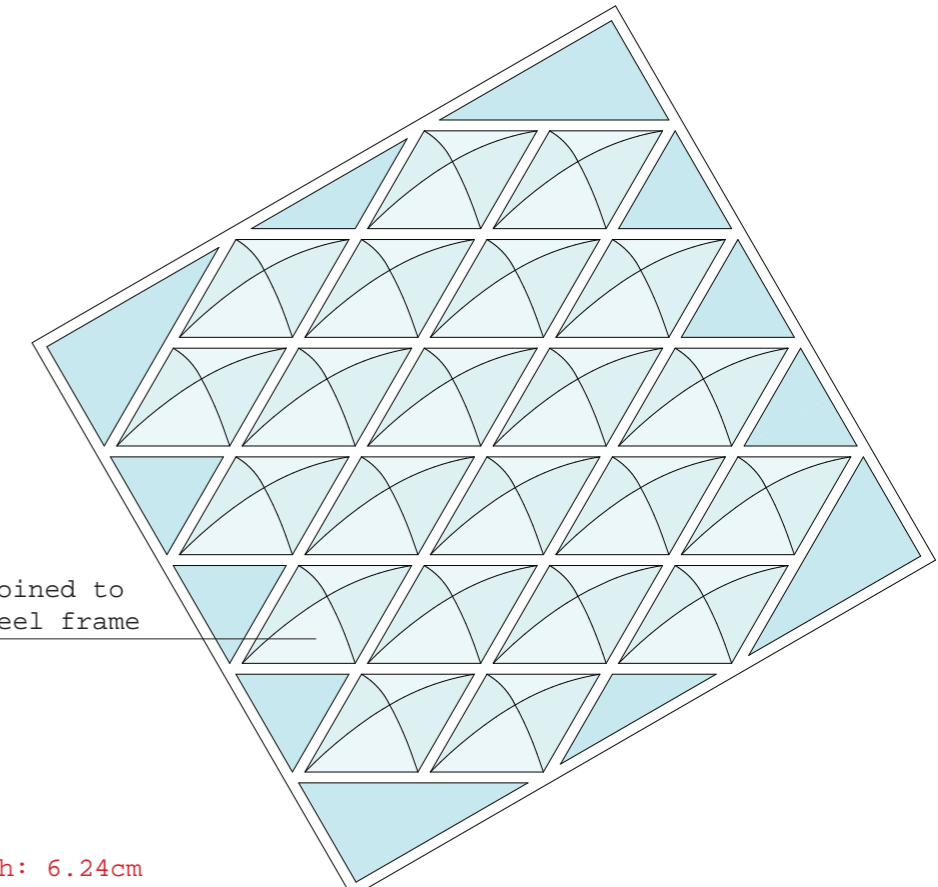
**ETFE**

- A transparent polymer that is used instead of glass and plastics in some modern buildings
- strong enough to bear 400 times its own weight
- stretched to three times its length without loss of elasticity
- can be repaired by welding patches over tears
- nonstick surface that resists dirt
- expected to last as long as 50 years
- costs 24% to 70% less to install
- transmits more light
- transmits more sound than glass
- usually applied in several layers that must be inflated and require steady air pressure
- too complex to be used on small residential projects



Three-dimensional display window: the convex and concave curves of the glazing  
 Rhomboid: sturdy facade framework  
 Effective seal: inner faces wet-sealed with silicone

ETFE bubbles  
 steel frame, welded together  
 7mm width



Bubbles joined to welded steel frame

**RHOMBOID**  
 Height: 6.24cm  
 Width: 10.8cm  
 Diagonal length: 6.24cm