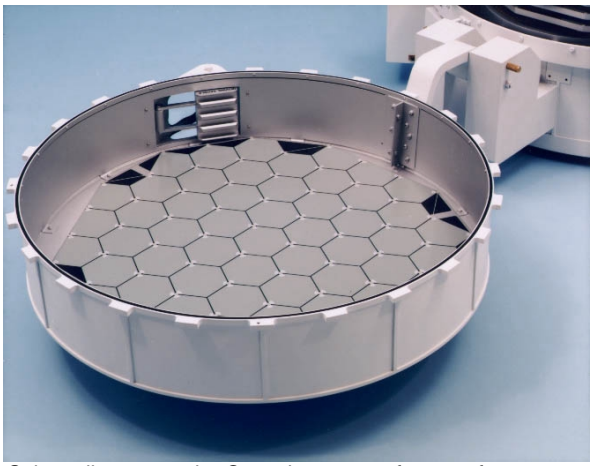
Dynamic Design: A Collection Process

Modeling Solar Wind Collection: A Sticky Situation

STUDENT ACTIVITY-PART 1

In this activity you will model how different materials collect different solar wind particles. In the Genesis spacecraft, the wafers will be made out of various materials in order to collect different elements and isotopes. All elements from atomic numbers 3 through 92 will be analyzed. Hydrogen and Helium make up the bulk of the sun and will have to be "filtered out." In this first activity, you will throw projectiles onto different surfaces and determine which of them embed.



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Solar collectors on the Genesis spacecraft are wafers attached to a frame.

PROCEDURE

1. Solar collectors on the Genesis spacecraft are wafers attached to a frame. The wafers are made of different materials based on the type of solar wind particles that the scientists plan to capture and analyze.

2. Based on the materials that will be used in this activity, predict which projectiles will embed into each surface, which will stick and not embed, and which will neither stick nor embed. Solar wind particles will be embedded into the collectors. In your small group, operationally define "embed." The following grid may be used to help make the predictions. Label projectiles and surfaces used in this data table:

Key: E = projectile will embed S = stick N = not stick ?= unsure

PREDICTION DATA TABLE					
		Projectile 1	Projectile 2	Projectile 3	Projectile 4
Surface 1					
Surface 2					
Surface 3					
Surface 4					

3. Which variables should be controlled in this experiment? How will you control the variables?

4. Obtain the materials and construct the projectiles if needed. Then test each of your projectiles against the various surface materials.

5. Record your results in the following table. Make sure to complete three trials per projectile per surface.

Key: E = projectile embedded S = projectile stuck N = projectile did not stick or embed

Surface:

Surface 1	Projectile 1	Projectile 2	Projectile 3	Projectile 4
Trial 1				
Trial 2				
Trial 3				

Drawings and Additional Observations:

Key: E = projectile embedded S = projectile stuck N = projectile did not stick or embed

Surface:

Surface 2	Projectile 1	Projectile 2	Projectile 3	Projectile 4
Trial 1				
Trial 2				
Trial 3				

Drawings and Additional Observations:

Key: E = projectile embedded S = projectile stuck N = projectile did not stick or embed

Surface:

Surface 3	Projectile 1	Projectile 2	Projectile 3	Projectile 4
Trial 1				
Trial 2				
Trial 3				

Drawings and Additional Observations:

Key: E = projectile embedded S = projectile stuck N = projectile did not stick or embed

Surface:

Surface 4	Projectile 1	Projectile 2	Projectile 3	Projectile 4
Trial 1				
Trial 2				
Trial 3				

Drawings and Additional Observations:

6. Complete the following questions:

a. Which surface had the most projectiles that were embedded?

b. Why do you think this is so?

c. What may have caused your results to differ from those of another lab group?

d. What would you suggest next time to have more particles embed?

e. If you were going to design wafers to collect the greatest number of different projectiles, which surface would you choose? Why?

f. If you were going to design boxes to collect specific projectiles, which would you choose?