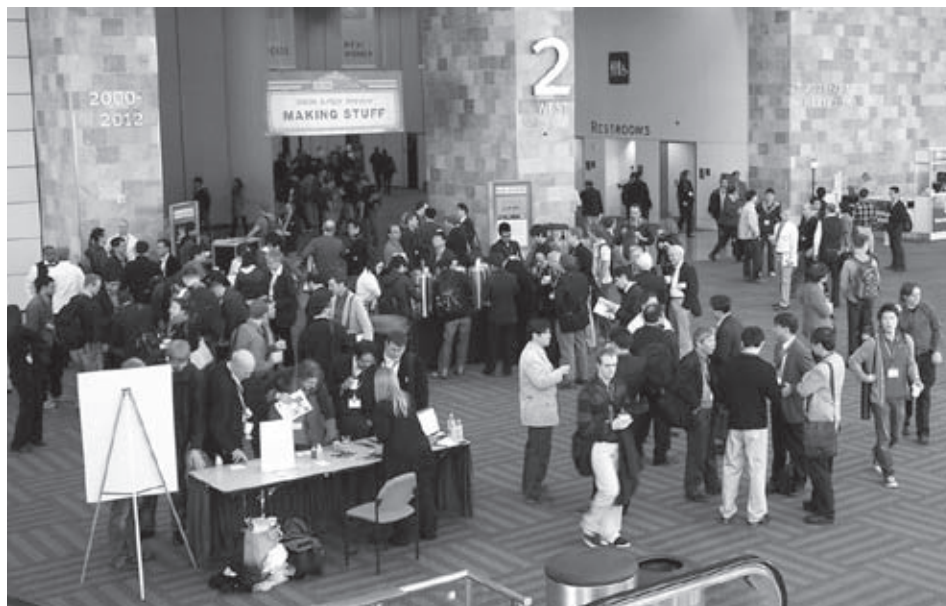


MAKING STUFF Events & Activities at a Glance

You may be new to organizing events, or you may have years of experience. Whether you work with small groups or large ones; or in intimate settings or large venues, the step-by-step planning guidelines and resources provided here will assist you in making an event of any size a safe, rewarding, enjoyable experience for all. In addition to organizing your own event, consider finding groups in your community that are already hosting science programs and join their effort as well. Offer to host an information table, present a demonstration, furnish a video clip from the series, or coordinate a speaker for the event. Then, use the toolkit to prepare your portion of the event.

Planning a *Making Stuff* Event

Convey the excitement and importance of materials science in our everyday lives. Reach and engage large numbers of people by joining an event—such as a community fair, festival, or professional society meeting—or by hosting one of your own.



Hosting a *Making Stuff* Information Table

Use this versatile, flexible approach in a variety of high-traffic venues or as part of larger events to engage new audiences in materials science. Select some of the resources to display at your table and hand out to visitors.

Giving a *Making Stuff* Presentation

Use the provided PowerPoint™ presentation, a demonstration or activity, and a video clip to engage your audience and spread the word about materials science.



Holding a *Making Stuff* Screening and Panel Discussion

Gather a crowd, play a video clip from the *Making Stuff* program, and discuss. Or use a facilitated discussion with local materials scientists and others to introduce people to the excitement and relevance of materials science.

Facilitating a *Making Stuff* Science Café

Invite a scientist to a bar, coffeehouse, or other venue to engage in a lively discussion about materials science. The informal setting and conversational tone help make the science accessible and engage a general audience.

Training Educators and Scientists

Host effective communication workshops for scientists, and materials science workshops for educators. These hour-long trainings will cover project background as well as communication and engagement strategies.

Presenting *Making Stuff* Activities & Demonstrations

Fascinate audiences with live materials science demonstrations linked to each episode. These scripted presentations demonstrate some of the principles, advances, and applications of materials science. Detailed instructions enable scientists, engineers, educators, and others to take center stage in a science center, afterschool setting, or other public venue to communicate their enthusiasm for materials science.

Partner with local afterschool or other youth groups to educate and involve young people in materials science. Choose from four activities in the *Making Stuff* Activity Guide. This inquiry-based Activity Guide engages 10- to 12-year-olds in hands-on activities to broaden their understanding of basic materials science principles and how they affect their daily lives.

At an event, distribute the *What's This Stuff? asks David Pogue* flyer. This online and in-person game will challenge participants to identify mystery materials. If possible, set up a station at an event for visitors to access the online portion of the game. See the Engaging Youth section of this toolkit, as well as the flyer, for further information.



Planning a MAKING STUFF Event

Events can be large, multiple day affairs or smaller events that take place at a museum, university, community center, county fair, school, career fair, mall, or park. You can organize your own event or join one hosted by another group. If you decide to organize your own, the guide below provides logistical tips and strategies for running a successful event from start to finish. If you are joining someone else's event, select the planning tips that relate to your portion of the event.

1. Find partners for your event committee

Partners are key to developing a successful event. Recruit committee members from your coalition partners and other organizations with compatible goals. Partners can help with the planning and can often provide speakers, funding, volunteers, and publicity. Clearly define the roles and responsibilities of each participating organization to help the committee work effectively and stay on track throughout the process.

2. Hold a planning meeting

Below are some considerations you will want to discuss with your coalition partners.

- What is the event goal? How large a focus will there be on materials science, general science, and/or engineering?
- What is your budget for the event?
- Identify your target audience. Who will be attending the event? What is the age range?
- Estimate the size of your event. What is the ideal number of attendees?
- Select a date (and a rain date). Research other area events that may pose a conflict.
- Decide how long the event should last. Determine whether morning, afternoon, or evening is best or whether it will be a daylong event.
- Make a list of possible venues.
- Determine how many vendors, performers, speakers, and volunteers you will need and where you will find them.
- Develop a planning timeline, spelling out what needs to happen, when it needs to happen, and who is responsible for making it happen.

3. Select a venue

An event can be held just about anywhere, such as a museum, shopping mall, park, library, school, or youth and recreation center. When selecting a venue, consider the following:

- Is the location convenient and accessible by public transportation?
- Is it centrally located to attract passersby?
- How many people can it accommodate?



- Is it accessible to people with disabilities?
- Is there adequate parking? (Be prepared to make additional parking provisions.)
- Does the space lend itself to audience participation?
- Is there a reservation process to secure the location?
- Is there adequate access to electricity, water, and waste disposal?
- Do you need a quiet area for viewing the video clip?
- Does it have onsite audio-visual equipment and technical support, or do you need to provide this?
- Does it have restroom facilities?
- Are tables, chairs, stanchions, sign-holders, trash cans, and other furniture or equipment available for the event? Will these need to be rented from another source?
- Is a stage or other area available for a panel discussion or to present the demonstrations?
- Is a permit needed for your venue or vendors, or is it a public space?
- If insurance is required, will it be provided by you or by the venue?

4. Plan the agenda

Once you have identified an existing event to join or decided to create a new event, consider the following possibilities:

Host an information table

Showcase materials science and *Making Stuff* by hosting an information table. At your table, you can stimulate visitors' interest in materials science by showing a video clip, having them do an abbreviated activity, staging a demonstration or distributing *Making Stuff* giveaways, and engaging them in an exchange of ideas.

For more information, see the guidelines for Hosting a *Making Stuff* Information Table (page 19).

Present Making Stuff demonstrations

Bring the excitement of cutting-edge materials science to your audience with live, interactive demonstrations of the principles and applications of materials science. There are four to choose from:

Making Stuff: Stronger—Breaking Point: Testing Tensile Strength

Visitors learn that materials can be strong in different ways and that materials scientists test the strength of materials by stressing them to their breaking point.

Making Stuff: Smaller—Nanowires and the Ever-Shrinking Microchip

Visitors learn about extremely small, thin wires, called nanowires, that may help make computers and electronics even smaller in the future.



Making Stuff: Cleaner—Instant Cheese Bioplastic

Visitors learn about cleaner environmentally-friendly plastics made from biological materials.

Making Stuff: Smarter—Shape Shifters: Shape-Memory Alloys & Polymers

Visitors learn about two shape-memory materials that can be programmed to return to a previously set shape when exposed to heat.

For more information, see the section on Presenting *Making Stuff* Demonstrations (page 31).

Facilitate Making Stuff activities

Engage event attendees of all ages through *Making Stuff* activity stations. Select from the four activities in the *Making Stuff* Activity Guide.

When selecting activities, consider the following:

- What activity-to-attendee ratio do you want to provide?
- Which combination of activities best supports your event's goals?
- Have you included a variety of activities for visitors of different ages and interest levels?
- Who will organize and facilitate each activity?
- What materials do you need to collect, photocopy, or prepare before the activity?

The following is a short description of the four activities from the *Making Stuff* Activity Guide. Activities take about 45 minutes to an hour and are geared toward students aged 10 to 12, but can be enjoyed by adults as well:

Making Stuff: Stronger—Spoon Drop Strength Test

Participants test the strength of various readily available materials.

Making Stuff: Smaller—Magnetic Microbot Models

Participants build magnet-driven micro-“robots” and learn about magnetic materials and the challenges of building on the small scale.

Making Stuff: Cleaner—Build a Cleaner Battery

Participants build a saltwater battery and scale it up to run small electrical devices while learning about clean energy.

Making Stuff: Smarter—Smart Glove

Participants explore a non-Newtonian fluid, a “smart” material that thickens in response to an impact.

Show a video clip from the Making Stuff series

Video is a great way for attendees to visualize and understand materials science. If the event is small, propose that event organizers show a short *Making Stuff* video clip, followed by a brief presentation about materials science. For larger events, the longer video clip can be shown as a continuous loop in a designated quiet corner or separate viewing area. Pick one that meets your needs. (*Requires a video clip, laptop or DVD player, monitor, and extension cords.*) For more on ordering the *Making Stuff* series in its entirety, visit pbs.org/nova/makingstuff.



Coordinate a speaker

To highlight contributions of materials science to society, you may want to have one or two speakers kick off the event. Speakers may be representatives from your organization or from your event partners' organizations. Some things to consider when you have a speaker include:

- Is your potential speaker articulate and engaging?
- What are the key talking points you want the speaker to cover?
- What role do you want the speaker to play in finalizing the agenda and talking points?
- How long do you want the speaker to present?
- How will the speaker engage the audience? (A question-and-answer session? Small group discussions? Activities?)
- Who will introduce and thank the speaker?
- Where will the speaker stand?
- Can the space accommodate the expected audience?
- Do you need a podium or table?
- Does the speaker need a microphone and public address system? Props or audio-visual equipment?
- Will you hold a run-through before the actual presentation?
- Is it appropriate to include event signage or banners in this area?
- Does the speaker want to distribute handouts or do an activity with the audience?

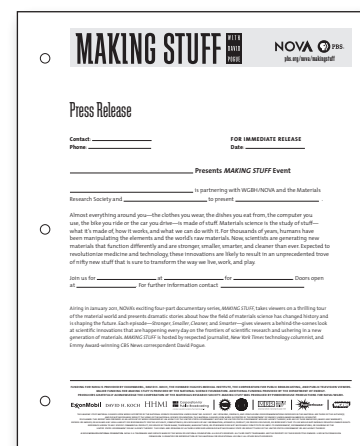
(For a more complete set of recommendations, see the section on Holding a *Making Stuff* Screening and Panel Discussion—page 23.)



5. Promote and advertise the *Making Stuff* event

Promoting your event well in advance helps ensure that it is successful and that it achieves the attendance you want. To help you spread the word, use the *Making Stuff* Customizable Press Release in the *Making Stuff* Resources section to promote your event. Get the word out through:

- TV (public service announcements, advertisements, newsletters, and member magazines)
- Radio (public service announcements, advertisements, newsletters, and member magazines)
- Community and daily newspapers (calendar listings and/or advertisements)
- Posters and flyers in the community (download a *Making Stuff* logo from pbs.org/nova/makingstuff and create your own flyer)
- Internet sites (Facebook® events, Twitter®, e-newsletters, meetup.com, craigslist.com, Classroom 2.0)
- Word of mouth: tell your friends and family
- Buttons or stickers



6. Recruit and coordinate volunteers

Your most valuable resources are your volunteers. Each staff member and volunteer should be assigned to a particular activity. For example:

- Welcome and information table
- Demonstrations and activity stations
- Technical support, such as audio-visual equipment and electricity

Here is a checklist of things to keep in mind as you plan for volunteers' participation:

- Appoint a volunteer manager to coordinate volunteer assignments. This person is responsible for assigning specific tasks to each volunteer, training volunteers, explaining the day's event(s) to the volunteers, answering questions, and troubleshooting.
- The number of volunteers you recruit will determine how many activities you can offer and vice versa. We recommend two volunteers to staff each activity station. Adults and responsible youths make good activity facilitators.
- If you anticipate high attendance, you may need volunteers to help with security and parking. You may also need additional volunteers at each activity station.
- Plan to provide volunteers with nametags and identifiable outfits.
- Create an event schedule that shows volunteers' assignments and break and meal times.
- Schedule volunteer training a week before the event. At the training, provide snacks and drinks (pizza is quick and easy), share the event goals and schedule, assign roles, and explain responsibilities. Have volunteers staffing the hands-on activity station do the activities themselves before the event.
- If you are able to host the training in the same location as the event itself, schedule a tour and show the volunteers where each station will be located.

7. Complete the on-site logistics

Whether you are planning a small event or an all-day affair, there are simple things that help traffic move smoothly, reduce overcrowding and lines, create a safe and secure environment, and help the event end on a high note for all.

Prepare the event space

- For large events, consider devoting multiple tables to the same activity to avoid crowding.
- Leave space between tables to prevent overcrowding.
- Arrange a U-shaped table (using three or four tables) to form a space where volunteers can work, interact with visitors, and restock supplies.
- Set up each activity in its own area with one or several six-foot tables, chairs, or stools for the activity facilitators, and at least one activity sign per table.

- Depending on the event size, you may want to set up stanchions around the demonstrations and activity areas, so as not to overwhelm the facilitators and visitors.
- Cover tables with colorful cloths. For activities involving water, use plastic tablecloths. Secure cloths with tape or clips so that they don't move while participants are working.
- Store extra supplies under the table so that they will be readily available but not in the way.
- Supply each activity area with materials and instructions. Placing instructions in a clear acrylic frame helps make them more visible.
- Place a trash container under each table.

Post signs and photos

Signage is a key factor in getting people to and around your event. Signs at all venue entrances should mention the event name and room location. Download the logo and create signs for the Welcome and Information tables and the podium. To display the images and signs, set them in clear acrylic table stands or mount them on foam core.

Coordinate the volunteers

- Schedule a day-of-event orientation at least one hour before your event opens. At this orientation, give volunteers an overview of the day, remind them of their assignments, give them their schedules, and review restroom locations and venue-specific information.
- Designate some volunteers as floaters. They can cover stations during assigned breaks and lunch.

Clean up

At the end of an event, the staff and volunteers are tired and there is generally a big mess. Make things easier by having lots of large trash bins, recycling boxes, dustpans, and brooms.

Send thank you notes and debrief the event (share lessons learned)

Whatever your event's size and scope, take the time to thank everyone involved. From the smallest task to the grandest, a thank you is greatly appreciated and garners good will.

An informal gathering with food and drink held shortly after the event is a great way to celebrate in a friendly, relaxed atmosphere. You can also use it as an opportunity to evaluate the event and learn how to improve future ones.



Please let us know how your event went!

Contact: Jennifer Larese
 Outreach Coordinator
 WGBH Educational Outreach
 One Guest Street
 Boston, MA 02135
 617-300-4316
 jennifer_lares@wgbh.org

Hosting a MAKING STUFF Information Table

An information table is a versatile way to introduce large numbers of people to materials science and to encourage their participation in the *Making Stuff* outreach activities. You can set up a table in a variety of high-traffic venues (e.g., museums, libraries, malls, schools, universities, and faith-based organizations) or as part of larger events (e.g., fairs, professional societies, and other community-wide activities).

For many people who stop at your table, it may be the first time they have heard about materials science. When you talk with them, describe some ways that materials science impacts their daily lives.

Setting Up Your Information Table

1. Recruit and train volunteers to staff the table

Generally, it is advisable to have two people at a table—one person to facilitate the activity and another to talk to people and replenish the table resources. In advance of the event, have them read the information sheet (*What Is Materials Science?*), watch the *Making Stuff* promotional video clip, and try any of the activities or demonstrations you choose to use. Encourage the volunteers to contact you with any questions.

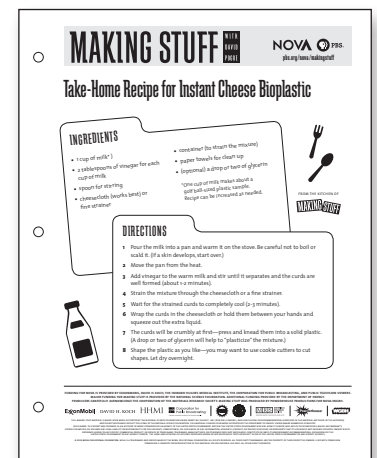
2. Set up the table

Use the provided files or the logo to make signs for your table. Download, print, and photocopy a combination of the toolkit resources to display and distribute at your table and set out any items you plan to distribute. For example:

- Information sheet: *What Is Materials Science?*
- Recipe for instant cheese bioplastic from *Making Stuff: Cleaner* demonstration
- *Making Stuff* online game flyer: *What's This Stuff? asks David Pogue*
- An activity from the *Making Stuff* Activity Guide to do at home

3. Do a short demonstration or activity

Activities engage people and help them learn about materials science. See the *Making Stuff* Demonstrations section for ideas, or consider presenting a shortened version of one of the activities from the *Making Stuff* Activity Guide. (Bring enough materials for the number of people you think may visit your table.)



4. Show a *Making Stuff* video

A *Making Stuff* video is another way to convey information about materials science. The promotional clip provides a short introduction to the show, whereas the screening segment is longer and more detailed. Either can be played on a loop. Designate space on your table for a monitor (or computer). Make sure there is an electrical source.

5. Miscellaneous materials

You've established the message points you want to convey, copied the information sheets, collected materials for your activities, chosen the video clip, printed and posted the signs, and trained your staff. What's left? Make sure you have:

- Pens and pencils
- Nametags (Wear a nametag with your first name in large letters to make visitors feel comfortable.)
- Table and chairs
- Trash can



Giving a MAKING STUFF Presentation

An effective way to spread the word about materials science is to make a short presentation to civic, educational, professional, and community-based groups. Engage your audience with a PowerPoint™ presentation, an activity or demonstration, and a video clip. These resources communicate the idea that materials science is important and has an impact on everyday life—a key message of the *Making Stuff* outreach campaign.

Planning a Presentation

1. Find partners and make connections

The community organizations listed below are examples of groups that may be interested in having you present about materials science. Contact them and offer to make a presentation.

- Science and technology museums
- Major employers and businesses
- Newspaper reporters and public TV and radio station producers
- Civic organizations (e.g., Rotary, the Kiwanis, Lions Club, etc.)
- Chambers of Commerce
- Youth groups (Girl Scouts, Boy Scouts, 4-H)
- Local schools
- Education groups and teacher associations
- Local science, math, engineering, or technology conferences
- National Science Foundation Research Centers (Materials Research Science and Engineering Centers/Nanoscale Science and Engineering Centers [MRSECs/NSECs])
- Materials Research Society (MRS) university student chapters
- Nanoscale Informal Science Education (NISE) Network hubs and partners
- University materials science and engineering departments
- Department of Energy research labs
- Local science cafés

2. Plan your presentation

Following the steps below to educate your guests about materials science can motivate them to learn more. Mix and match the elements to suit your audience and your objectives.

Show the *Making Stuff* presentation

Use the *Making Stuff* PowerPoint™ overview presentation, which helps audiences engage and learn about materials science. It highlights the contribution of materials science in everyday life.



Conduct a demonstration

Give your presentation an interactive component by having your audience participate in a hands-on demo. See the *Making Stuff* Demonstrations section of the toolkit (page 33). For other activity ideas, see the *Making Stuff* Activity Guide.

Show a video clip from Making Stuff

Video can be a powerful tool for helping people visualize and understand materials science. Show the shorter promotional video clip that gives an overview of the *Making Stuff* series.

Distribute handouts

Photocopy and distribute the information sheet on materials science found in the Resources section of the toolkit at pbs.org/nova/education/makingstuff.



Holding a MAKING STUFF Screening and Panel Discussion

Screening a video clip from *Making Stuff* and following it with a facilitated discussion is an effective way to promote awareness of the relevance of materials science in your audience's daily lives. This strategy can inspire them to learn more and share their knowledge with others.



Planning Your Screening and Panel Discussion

1. Find partners and make connections

For more detailed information on finding partners and making community connections, and suggestions of materials science partners, refer to the Giving a *Making Stuff* Presentation section (page 21). When making the initial contact with a group, explain who you are and that you are organizing an event in conjunction with *Making Stuff*. Before calling, review the *Making Stuff* overview PowerPoint™ presentation and be prepared to give a brief overview of the project. Consider showing potential partners the short promotional clip of the show.

2. Select a venue

There are many possible locations to host your event—local colleges or universities, libraries, museums, town or city halls, educational or professional organizations, or a public radio or television studio. Refer to the Planning a *Making Stuff* Event section in this toolkit (page 13) and review the questions to consider when selecting a venue. Also consider whether:

- the venue is centrally located to attract passersby,
- the space lends itself to audience participation, and
- there are facilities to allow phone-in questions and comments if the event is being broadcast.

3. Create an agenda

Below is a sample agenda of what your event might look like:

- Welcome and introduction of the event's materials science topic(s)
- Introduce the *Making Stuff* program and/or outreach campaign
- Introduce speaker(s)
- *Making Stuff* overview PowerPoint™ presentation
- Show the *Making Stuff* screening video clip
- Panel discussion
- Question-and-answer session
- Distribute the information sheet (*What Is Materials Science?*)



4. Secure presenters/facilitators

Work with your event partners to identify possible speakers, facilitators, and/or panelists. Consider tapping professional societies, such as the Materials Research Society (MRS). Also, contact universities and colleges, state and local research labs, and local MRS student chapters. Your speaker may want to use some or all of the *Making Stuff* overview presentation. When considering potential speakers and their needs, you may want to ask the following questions:

- Are your potential speakers articulate and engaging?
- What are the key talking points you want your speakers to cover?
- What role do you want the speakers to play in finalizing the agenda and talking points?
- How long do you want each presenter to speak?
- Will you hold a run-through before the actual presentation?
- How will the speakers engage the audience? (Questions and answers? Small group discussions? Activities?)
- Do the speakers want to distribute handouts or facilitate activities with the audience?
- Do the speakers need a microphone and a public address system?
- Will the speakers use props or audio-visual equipment?

For further details on promoting and advertising your event, recruiting and coordinating volunteers, and completing the onsite logistics, see the Planning a *Making Stuff* Event section of this toolkit (page 13).



Facilitating a MAKING STUFF Science Café

What is a Science Café?

A science café's casual meeting place, plain language, and inclusive conversation create a welcoming and comfortable atmosphere for people with a limited science background. Each meeting is organized around an interesting topic of conversation, such as plastics, nanotechnology, or alternative uses for Kevlar®. Ideally, a materials scientist will give a brief presentation and show a short video clip from *Making Stuff* to kick off the discussion.

1. Know your audience

A good understanding of your audience will inform every decision you make about your café. Choosing a target audience is not about whom you will let in, but rather whom you are trying to attract and make comfortable. Leveraging your coalition partners, you might want to feature multiple cafés—each café could focus on a slightly different topic that is tailored to a different audience: for example, a “junior” science café for young adults, college students, and even families.

2. Choose a time and place

The choice of meeting time and venue plays a large role in determining who will feel comfortable attending a café. It also affects how attendees act when they get there.

- Science cafés have been held in pubs, coffeehouses, bookstores, restaurants, art galleries, malls, and even bowling alleys. The point is to go where your audience already congregates naturally—even if it seems unconventional at first.
- Think about logistical issues, such as parking, acoustics, line of sight, reserving a block of time, flexible seating arrangements, public accessibility, and food and drink.
- Many venues have in-house audio-visual equipment, making it easy to show videos, such as the *Making Stuff* promotional video clip, and provide microphones if necessary.
- Most cafés do not pay fees to use the venue. Point out to the owner that the event will introduce the venue to many new people, and bring in new business.

3. Choose a moderator

The moderator can play an essential part in a café meeting. The café organizer often serve as the moderator, but this is not always the case. Either way, be clear about that role.

- A good moderator moves the event along and ensures that no one dominates the conversation (including the scientist!).



- The moderator typically introduces the scientist at the beginning of the café and keeps track of time. During the discussion, the moderator often helps the scientist keep track of who speaks next.
- The moderator may facilitate clear communication. For example, he or she may ask individuals who use technical jargon to rephrase what they want to say.
- The moderator can play a role in shaping conversation. If a particularly interesting topic is raised, the moderator may break from the routine of calling on people in the order they raised their hands to allow the room to explore a theme further.
- A group conversation that includes everyone in a room rarely happens naturally. It is up to the moderator to find ways to get as many people involved in the conversation as possible.

4. Choose a scientist

There are many resources beyond the local university for finding guest scientists to speak at your café. Within your coalition, ask around to find scientists and engineers who may be researching or working on a very interesting topic related to materials science.

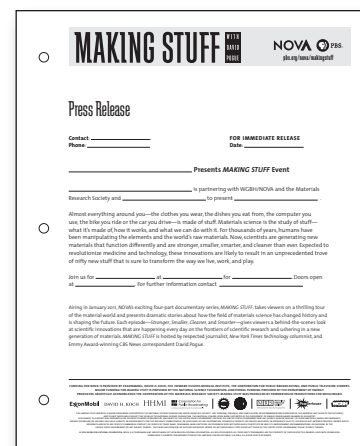
5. Prepare the guest scientist

The guest scientist gets a meeting's conversation going in the right direction and helps set the overall tone of the event. Do not be shy about coaching the scientist on the audience and goals of your café. When inviting scientists to participate, be clear about their role and the atmosphere you are trying to create. Let the scientists know that you are not asking them for a speech or lecture, but for a short conversation starter. Have them consider what questions they would like to ask the audience about the topic. Help the moderator and scientist establish a rapport. If possible, introduce them to each other before a café and buy them a meal or drink. If you are using video in your café, give the scientist the opportunity to view it in advance.

6. Promote your café

Word of mouth and e-mail are the most effective ways to draw people to your event. To capitalize on this, choose a catchy name, come up with intriguing descriptions for topics, think about your audience, and pick a venue that people are excited to visit and invite their friends to.

- Send notices to local calendar listings (both in print and at internet sites like craigslist.org and meetup.com).
- Many local newspapers and TV stations will list events for free.
- Post flyers in areas that are popular with your audience. (See sciencecafes.org/organizers.html for a sample flyer.)



- Choose promotional partners who will help you reach your audience. For example, if you are trying to reach people who are not already science enthusiasts, you may not want to advertise at other science events. Consider using student groups, community organizations, and local businesses as promotional partners.
- Specific topics let you reach out to groups that are not used to talking about science. For example, a science café on materials science may be an opportunity to partner with a group of green entrepreneurs or an engineering society.

7. Fine tune the café experience

- Mind the gap. Have you ever noticed that your café audience is the most animated during breaks? Tap into this energy by giving everyone a few minutes to socialize after a scientist has finished a presentation and before starting group discussion.
- Go beyond Q & A. A group conversation that includes everyone in a room rarely happens naturally. It is up to a café’s moderator and guest scientist to find ways to get as many people involved as possible.
- Go on tour. Are people sticking around after your event is “over” to keep discussions going on their own? Having the scientist go from table to table at this point can lead to the best conversations of the event.
- Trivia. As people are arriving for a café, trivia questions can get them talking together and thinking about a topic. Or distribute the online game flyer and play *What’s This Stuff?* asks David Pogue.
- Keep the momentum going. Circulate an e-mail sign-up list for future cafés in your area.
- *Making Stuff* resources that could be used at a science café include the online game flyer and the materials science information sheet.

For more information and additional resources, please visit sciencecafes.org. Feel free to contact WGBH directly for science café–related questions at: getinvolved@wgbh.org

Training Educators and Scientists

Two PowerPoint™ training presentations found at pbs.org/nova/education/makingstuff can help your organization host effective communication workshops for scientists and materials science workshops for educators. These hour-long trainings will cover project background and communication and engagement strategies. The presentations can then be used by participants to train other teachers and scientists on how to communicate materials science to a variety of audiences.

Educator Training

The training presentation for educators provides teachers with the information and science content they need to integrate materials science topics into their classrooms. The presentation also provides talking points and ideas for discussion while highlighting the day-to-day contributions that materials science has made to our lives, as well as discussing the science behind the headlines.

Consider a short discussion about science cafés tailored to a younger audience. A “junior” science café, in an age-appropriate venue, could be an opportunity to talk about materials science with middle and high school students.

1. Find educators and make connections

The educational organizations listed below are samples of those that may be interested in having you present about materials science. Contact them and offer to schedule a materials science workshop using the Training Presentation for Educators.

- Local schools (K–12)
- Informal educators at afterschool programs, science and technology museums, and children’s museums
- Education groups and teacher associations
- Youth group leaders (Girl Scouts, Boy Scouts, 4-H)

2. Review the Training Presentation for Educators

Mix and match the elements to suit your audience and your objectives. In addition to the training presentation, perhaps:

Present a demonstration

Give your presentation an interactive component by having your audience participate in a hands-on demonstration. See the *Making Stuff* Demonstrations section of the toolkit (page 33). For other activity ideas, see the *Making Stuff* Activity Guide.

Show a video clip from Making Stuff

Video can be a powerful tool for helping people visualize and understand materials science.



Scientist Training

For those who know the science, but are not sure how to talk to a lay or young audience in an engaging way about the ideas and theories behind it, this presentation will help guide them. The training presentation for scientists will highlight the main topics of materials science that align with the *Making Stuff* content, as well as offer tips on how to present the ideas in engaging and meaningful ways to your audience. Whether you are visiting a junior science café to present to high school students or talking about materials science to local teachers, the presentation will cover the what to say about materials science and how to say it for a variety of audiences.

1. Find scientists and make connections

The scientific organizations listed below are examples of those that may be interested in a presentation about communicating materials science to the public. Contact them and offer to schedule a workshop using the Training Presentation for Scientists.

- Science museums and technology centers
- Local science, math, engineering, or technology conferences
- National Science Foundation Research Centers (Materials Research Science and Engineering Centers/Nanoscale Science and Engineering Centers [MRSECs/NSECs])
- Materials Research Society (MRS) university student chapters
- Nanoscale Informal Science Education (NISE) Network hubs and partners
- University materials science and engineering departments
- Department of Energy research labs

2. Review the Training Presentation for Scientists

Mix and match the elements from the toolkit to suit the audience and objectives. In addition to the training presentation, perhaps:

Present a demonstration

Give your presentation an interactive component by having your audience participate in a hands-on demo. See the *Making Stuff* Demonstrations section of the toolkit (page 33). For other activity ideas, see the *Making Stuff* Activity Guide.

Show a video clip from Making Stuff

Video can be a powerful tool for helping people visualize and understand materials science.

Encourage workshop participants to further spread the word about *Making Stuff* and materials science. Participating scientists may be interested in presenting the *Making Stuff* overview PowerPoint™ presentation and the *Making Stuff* promotional video clip at various events. See Giving a *Making Stuff* Presentation (page 21) for further details.



Engaging Youth in MAKING STUFF Activities

Materials science isn't just for adults. At events, use activities from the *Making Stuff* Activity Guide to engage younger attendees at activity stations. The activities can be used as a follow-up to a demonstration or as stand-alone explorations in a variety of settings. The *Making Stuff* Activity Guide is geared toward ages 10 to 12, but the activities can be enjoyed by families and adults as well. The activities take about 45 minutes and are designed for small groups, working at or near a table. The materials are inexpensive and readily available at grocery, hardware, and home supply stores. We recommend that you collect all of the necessary materials in advance and ask the volunteers who will be facilitating the activity to practice it before the day of the event. The following is a short description of the four activities from the *Making Stuff* Activity Guide.

Making Stuff: Stronger

Spoon Drop Strength Test: Participants test the strength of various readily available materials, such as aluminum foil, plastic wrap, newspaper, and waxed paper.

Making Stuff: Smaller

Magnetic Microbot Models: Participants build small magnet-driven model “robots” and learn about magnetic materials and the challenges of building on the small scale.

Making Stuff: Cleaner

Build a Cleaner Battery: Participants build a saltwater battery and scale it up to run small electrical devices while learning about clean energy.

Making Stuff: Smarter

Smart Glove: Participants explore a non-Newtonian fluid, a “smart” material that thickens in response to an impact.

Online Game: WHAT'S THIS STUFF? ASKS DAVID POGUE

The *What's This Stuff? asks David Pogue* online game challenges players to reveal the identity of a set of mystery materials by deciphering clues that the materials “themselves” reveal. *What's This Stuff? asks David Pogue* will engage players as they play at home or in informal educational settings. The game will launch on the NOVA Web site in conjunction with the series broadcast. See the flyer for more information and to engage visitors in an enjoyable online and in-person game.

Extension Activities

- Consider presenting a “junior” science café in an age-appropriate venue. See *Facilitating a Making Stuff Science Café* (page 25) for further details.
- Organize an afterschool materials science club to investigate the materials all around us.

Presenting MAKING STUFF Demonstrations

Bring the excitement of cutting-edge materials science to your audience with live, interactive demonstrations of the principles and applications of materials science with one or more of the following demonstrations, and video clips from *Making Stuff*.

Making Stuff: Stronger—Breaking Point: Testing Tensile Strength (page 33)

The audience participates to test and compare the tensile strength and elasticity of Kevlar®, Nylon, and cotton thread by lifting weighted buckets with wooden dowels and then comparing the Kevlar® to steel wire. Visitors learn that materials can be strong in different ways and that materials scientists test the strength of materials by stressing them to their breaking point.

Making Stuff: Smaller—Nanowires and the Ever-Shrinking Microchip (page 43)

Visitors use a Styrofoam® block and pipe cleaners to demonstrate the challenge of working on the nanoscale (placing millions of wires and transistors onto tiny chips) to produce smaller but more powerful computing and electronic devices. Visitors learn how difficult it is to work on the small scale and that materials scientists are developing extremely small, thin wires, called nanowires, that may help make computers and electronics even smaller in the future.

Making Stuff: Cleaner—Instant Cheese Bioplastic (page 54)

In this two-part demonstration, visitors learn about bioplastic, a material made of plant or animal matter that is cleaner because it breaks down more easily in the environment than petroleum-based synthetic plastics. Visitors learn how to make and explore a simple bioplastic by curdling milk with vinegar in a process similar to cheese making.

Making Stuff: Smarter—Shape Shifters: Shape-Memory Alloys & Polymers (page 63)

In this two-part demonstration, visitors learn about two shape-memory materials that can be programmed to return to a previously set shape when exposed to heat. Visitors also learn about exciting new smart products that materials scientists are developing to help solve problems in engineering, medicine, and everyday life.

When planning demonstrations, consider the following:

How many attendees do you expect?

The demonstrations can be presented at a cart, table, or stage for any number of visitors; however, an audience of 5 to 15 is recommended to ensure the highest degree of participation. Some demonstrations, such as the tensile strength test, are ideal for a larger audience, as up to 10 volunteers can participate directly in the demonstration. Others, such as the nanowire demonstration, are better suited for smaller groups, as it involves more discussion with visitors.

Have you included a variety of activities for visitors of different ages and interest levels?

The scientific content of the demonstrations is geared toward ages 12 and up; however, younger children can participate and remain engaged by the demonstrations. For example, in the nanowire demonstration volunteers engage in a hands-on activity involving a foam block and pipe cleaners, which younger children can do. In the instant bioplastic demonstration, participants mold a simple milk-based bioplastic into a preferred shape. In the shape-memory demonstration, volunteers bend plastic strips into shapes, straighten them out, and watch as they re-form when dropped into warm water. In the tensile strength demonstration, younger volunteers can participate by loading the water bottles into the buckets or by teaming up with another volunteer to hold a lighter bucket.

Who will organize and present each demonstration?

The presenter can be a museum educator or materials scientist or anyone with an enthusiasm for science and science education and the desire to share it. The detailed step-by-step scripts are accessible to those without previous demonstration experience. Demonstrators should practice in advance to ensure the best result.

What materials do you need to collect, photocopy, or prepare before the demonstration?

For further details on each of the demonstrations, see the scripts (found in the *Making Stuff* Demonstrations section). Each demonstration contains the following sections: Overview, Science Background, Materials List, Showing Video Clips from *Making Stuff*, Advance Preparation, Demonstration Script, Applications, Glossary, and Safety Notes. Frequently asked questions about the topics are answered in easy-to-reference sidebars, and any reproducible handouts are included at the end of the section. Don't forget to bring any equipment you will need to show video clips at the site of the demonstration.

WGBH/NOVA would like to extend our deepest appreciation and thanks to the Museum of Science, Boston, particularly museum educator Karine Thate, who helped develop the four demonstrations and tested them live for museum audiences and evaluators.



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