

## Whipping up a metallic frappé

Using only a kitchen blender and a laser, researchers have come up with a faster, cheaper, and cleaner method of producing ultrafine metal powders, such as the silver used in making solder, dental fillings, and high-speed photographic film. They can produce either individual particles or clumps of particles, such as the clusters of 10-nanometer particles of nickel and nickel oxide shown here.

Jogender Singh, a materials scientist at Pennsylvania State University's Applied Research Laboratory in State College, developed the process to produce silver and nickel powders. By firing a laser into a whirling solution of inexpensive chemicals, Singh and his team create hot spots where the materials react to form tiny particles of metal, they report in an upcoming issue of the *JOURNAL OF MATERIALS SCIENCE*.

The researchers can control the size and to some extent the shape of the particles by varying the concentrations of the chemicals in the blender, the intensity of the laser, and the blender's speed.

The technique can create particles of silver metal ranging in size from 1 to 100 nanometers—smaller than the smallest bacteria—at rates of up to 3 grams per minute, Singh says. This yield exceeds that from any other technique except grinding, which cannot generate such small particles. The silver powder is also purer and more uniform, he adds.

Production of increasingly fine metal powders "is a growing area of interest," says Steve Lampman of ASM International, an engineering materials society in Materials Park, Ohio. "Everybody wants to get powder size down for a variety of reasons—better mixing, better reactivity, and lower processing temperatures."

—S. Perkins



## U.S. survey explores relationship styles

An influential vein of psychological research suggests that the foundation of adult romantic love lies in childhood relationships with parents or other caretakers. Yet the implications for overall functioning of the so-called adult attachment styles had been masked because the studies had focused almost exclusively on college students and distressed individuals, such as incest survivors.

Now, scientists have examined for the first time the forms of interpersonal attachment in a nationally representative sample of U.S. adults. Their findings underscore the pervasive influence of attachment orientations on adults' lives, contend Kristin D. Mickelson and Ronald C. Kessler, both of Harvard Medical School in Boston, and Phillip R. Shaver of the University of California, Davis.

"Attachment patterns appear to be central organizing factors in personality and social development," the researchers conclude.

Three adult attachment orientations have garnered the most attention (SN: 8/9/97, p. 94). Secure attachment fosters lasting relationships marked by trust and compromise; avoidant attachment results in dread of or disdain for emotional intimacy in relationships; and anxious (or ambivalent) attachment leads to insecurity about close relationships and manipulative attempts to control

romantic partners.

Mickelson and her coworkers assessed these interpersonal styles in 8,080 adults age 15 to 54 who participated in a national survey that was designed primarily to examine rates of mental disorders and characteristics of people with various psychiatric diagnoses. During extensive interviews, volunteers responded to a brief series of questions about their close relationships; nearly all met the criteria for one of the three attachment categories.

The national distributions of secure attachment style, 59 percent, and of avoidant style, 25 percent, correspond roughly to earlier estimates from studies of college students, the investigators report in the November *JOURNAL OF PERSONALITY AND SOCIAL PSYCHOLOGY*. However, the rate of anxious attachment in the national sample, 11 percent, was only half that previously observed among college students.

On closer analysis, 17 percent of 15- to 24-year-olds in the new survey exhibit anxious attachment, compared to 8 percent of 45- to 54-year-olds. This pattern may reflect a greater propensity toward anxious attachment in the younger generation, the scientists observe. It could also mean that some anxious young adults gradually shift to a secure orientation (by forging a solid marriage, for

example) or to a self-protective avoidance of any intimate bonds.

The national results also suggest that neither of the insecure types of adult attachment stems simply from having had poor relations with one's parents. Rather, the styles exhibit a strong link to early traumas, such as physical abuse or serious neglect.

Parental substance abuse, divorce, and financial adversity also frequently characterize the childhoods of participants reporting insecure adult attachment styles.

"Insecure attachment is really about the absence of emotional trust in others, so such findings make sense," comments Jay Belsky, a psychologist and attachment researcher at Pennsylvania State University in State College.

For participants who grew up in two-parent families, mothers and fathers exerted comparable influences on adult attachment styles, the survey indicates.

Mental disorders clustered among survey participants who were avoidant or anxious, Mickelson's group notes. Insecure attachment styles may predispose some people to develop psychological conditions, they suggest; conversely, having a mental disorder may hamper the ability to form secure relationships.

A long-term study of attachment styles from childhood into adulthood should examine such possibilities, Belsky remarks. He knows of no such investigation now under way. —B. Bower