

# Researcher Discovers Universe Building Block Evolution

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The building blocks of planets and the life on them are formed inside of stars and returned to space in the form of stardust. In a new study, a University of Missouri-Columbia researcher discovered the formation of this stardust does not happen as expected, resulting in implications for star and planet formation.

"Understanding the nature of the material returned to space by dying stars is essential for our understanding of galactic chemistry, planet and star formation and the cosmos as a whole," said Angela Speck, assistant professor of astrophysics. "We always knew this process took place; we are now taking a big step toward understanding how this works."

Stars, like the sun, eventually run out of hydrogen in their cores and become red giant stars and asymptotic giant branch (AGB) stars. AGB stars are very bright, about 3,000 times brighter than the sun, but about half as hot as the sun. These stars are unstable and pulsate. The pulsations cause some of the atmospheric gas in these stars to be lost in surrounding space. As this hot gas drifts away from the star, it cools and forms dust grains. The material that sloughs off the star's outer shell and forms dust grains travels into interstellar space and is incorporated into large dust clouds that eventually will collapse to form new stars and planetary systems.

AGB stars in which the abundance of carbon atoms exceeds that of oxygen atoms have chemistries dominated by carbon and are known as carbon stars. One dust species known to form in the shells around carbon

stars is silicon carbide (SiC). SiC has been found in meteorites; and many of these grains are believed to have formed around carbon stars. Results from the study of these presolar, meteoritic SiC grains suggest that the nature of the SiC forming in carbon star outflows changes as the star evolves. The star initially produces relatively large grains and the grains formed are progressively smaller as the star dies.

"This finding is completely opposite of what was thought to be true," Speck said. "As the gas becomes denser the grains are getting smaller."

Speck presented observational evidence to confirm this suggestion at the American Astronomical Society meeting in Minneapolis, Minnesota. The study's poster presentation - The Nature and Evolution of Silicon Carbide in the Outflows of Carbon Star - is authored by Speck and co-authored by Anne Hofmeister, Department of Earth and Planetary Science, Washington University, St. Louis, Mo.; and Grant Thompson, Department of Physics and Astronomy student at MU.

**Link:** Poster image is available [online](#).

Source: [University of Missouri](#)

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