Scientific & Digital Briefs

By Shopper Editor Dave Bunting

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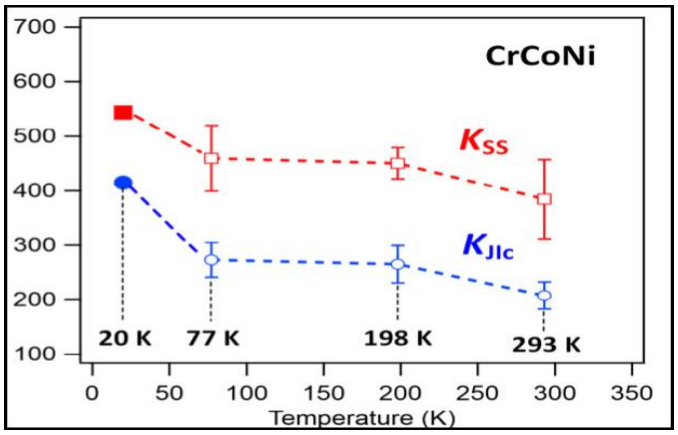

*K*JIc represents the crack-initiation toughness and *K*ss the crack-growth toughness. The *K*JIc and *K*ss values for the CrCoNi alloy are believed to be among the highest toughnesses ever reported. Image: School of Physics, University of Bristol

The toughest material on earth

A metallic alloy of chromium, cobalt, and nickel (CrCoNi) has amazed scientists, thanks to its properties. The material is impressively strong, meaning it resists permanent deformation, and at the same time remains extremely ductile, meaning it is highly malleable. Together, these two properties form the measurement of toughness, and CrCoNi is by far the toughest material on Earth.

CrCoNi is part of the high entropy alloy (HEA) family, materials in which the proportions of elements are roughly the same. These HEAs tend to have great toughness, but they have been difficult to test in the most extreme conditions. Technology has matured enough now to do that, and researchers at Lawrence Berkeley National Laboratory (Berkeley Lab) and Oak Ridge National Laboratory (ORNL), discovered that CrCoNi surprisingly gets tougher the colder it gets.

Excerpted from: Science magazine

Windows 7 & 8.1 support ends. Users must upgrade.

Major browsers like Chrome and Edge have also ended support for these platforms.

If your computer is on Win 7 or 8.1, you must upgrade to Win 10 or 11. If your computer is not capable of Win 10, you must get a new(er) computer.

Trump at "substantial risk of prosecution"

Indicted by Geogia Grand Jury, Trump's Georgia prosecution will likely be for his improperly influencing government officials, forgery and criminal solicitation.

This would be the first time in American history that a former president has been charged with a criminal offence.

Indictment and even conviction of a felony is no ground for disqualification of someone from running for president.

Messenger, Signal & Threema no longer secure

Messenger, billed as better than Signal, is riddled with vulnerabilities.

Matteo Scarlata and Kien Tuong Truong, two of the ETH researchers who co-authored the paper, said that all the flaws stem from a single trait: the use of a custom protocol rather than an established one that has stood the test of time.

But good news: "There's no evidence that any of the flaws have been actively exploited."

Steve Gibson leaves LastPass, moves to Bitwarden

Steve Gibson, internationally-recognized security expert, formerly the most prominent supporter of LastPass, now quotes this by Jeremi Gosney, a widely recognized expert in password cracking,

"LastPass's claim of "zero knowledge" is a bald-faced lie. [...] nearly everything in your LastPass vault is unencrypted. I think most people envision their vault as a sort of encrypted database where the entire file is protected, but no -- with LastPass, your vault is a plaintext file and only a few select fields are encrypted."

But believing the facts about LastPass insecurity, Gibson says:

"So, I went to, yes... https://bitwarden.com/twit/ and signed up for their $10 per year plan. I have no problem supporting them, and I like it that I'll be able to recommend them to others without newbies needing to pay anything up front.

"Then I went to a menu item I had never used in my LastPass vault: **"Export"** and I exported a 77 Kbyte CVS file. I opened my shiny new Bitwarden web interface and under "Tools" at the top was the menu item "Import Data". From a drop-down menu there, I selected the import source as being a "LastPass CSV", provided the filename and watched a perfect error-free transfer of my entire legacy LastPass data into Bitwarden. My password database, auto-fill credit cards and all of my secure notes made the move without incident or complaint.

"The last thing we need to talk about is the **remediation of any danger which may arise from any prior use of LastPass**.

"You should definitely check your LastPass Password Iterations to assure that it had been bumped up to 100,100. And **please** shoot me a note if you discover that it's not 100,100. I would love to have some corroboration of that most disturbing claim if some LastPass users were never upgraded.

"But assuming that your iteration count is 100,100, and that you're using a master password with good entropy, other than some incidental personal information disclosure of the sort that other commercial entities you work with on the Internet also have, your actual risk of having your own vault decrypted is very low."

Editor's note: LastPass has long been my password keeper based on Gibson's recommendation. But now, like him, and again based on his recommendation, I have moved to Bitwarden.

Roman thousand-years-strong concrete was hot-mixed using quicklime instead of slaked lime.

Why does the Roman concrete last millennia while modern concrete's life is very much shorter? Lengthy examinations have finally discovered the difference.

Romans used quicklime instead of, or in addition to, the slaked lime used now. Hot mixing, the team has now concluded, was actually the key to the super-durable concrete.

During the hot mixing process, the lime clasts found in Roman concrete develop a characteristically brittle nanoparticulate architecture, creating an easily fractured and reactive calcium source, which, as the team proposed, could provide a critical self-healing functionality. As soon as tiny cracks start to form within the concrete, they can preferentially travel through the high-surface-area lime clasts. This material can then react with water, creating a calcium-saturated solution, which can recrystallize as calcium carbonate and quickly fill the crack, or react with pozzolanic materials to further strengthen the composite material. These reactions take place spontaneously and therefore automatically heal the cracks before they spread.

Dave Bunting, Jan. 15, 2023 Credits are in links behind item titles.
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