KIMM FESENMAIER
Science Writer

The new material, called a micro-lattice, relies, appropriately, on a lattice architecture: tiny hollow tubes made of nickel-phosphorous. And absorbs energy well, has incredible strength and is part of a team of researchers from Caltech, HRL Laboratories, LLC, and the University of California, Irvine, who have developed the world’s lightest solid material, with a density of just 0.9 milligrams per cubic centimeter, or approximately 100 times lighter than Styrofoam. Though the material is ultra-low in density, it has incredible strength and absorbs energy well, making it potentially useful for applications ranging from battery electrodes to protective shielding.

“We’re entering a new era of materials science where material properties are determined not only by the microscopic makeup of the material but also by the architecture of the constituents,” Greer says. The material takes advantage of a hierarchical design: the wall thickness can be measured in nanometers, the diameter of each tube can be measured in microns, each tube is millimeters in length, and the entire micro-lattice material can be measured in centimeters (but might one day be made meters in length). Just as with large-scale structures, such as the Eiffel Tower, where order and hierarchy can lead to more efficient use of materials and improved properties, the same can be achieved by ordering materials on a tiny scale.

In addition to its ultra-low density, the micro-lattice makes the individual wall thickness-to-diameter ratio in the micro-lattice material the individual tubes ductile (i.e. they do not fail catastrophically), at higher aspect ratios, the material simply collapses and cannot recover. The research appears in the November 18 issue of Science. Additional coauthors on the report, “Ultraflat Metallic Lattices”, include Caltech postdoctoral scholar Jane Lian, as well as Alan Jacobsen, Adam Sorensen, and Bill Carter from HRL Laboratories, and Anna Torrents and Lorenzo Valdevit from the University of California, Irvine. The research was funded by the Defense Advanced Research Projects Agency.

The ultralight metallic lattice displayed above is easily supported by a budding sunflower.
Food with Mannion!
Do you like eating food?
How about free food at nice restaurants?
Ever want to tell the world exactly what you think of said food?

The Tech will be beginning a new column to chronicle the foodie experiences of new writers every other week... The Catch: They’ll be going head-to-head with Tom Mannion who will be reviewing the same restaurant. If you have ever thought you were more of a gourmet than our resident master chef, now’s your chance to prove it!
Email us for a spot on the list at tech@caltech.edu

Write articles for the Tech
get paid up to $30

CHILLAX – A relaxation group for stress management

Mondays 12-1; October 24 – November 28, Winnett Lounge
FREE

Health education and the counseling center are proud to sponsor a 6 week to educate and teach students how to manage their stress. The group will cover time management, muscle relaxation, getting great sleep, mindfulness meditation and dealing with holiday and exam related stress. Lunch is not provided but there will be participation prizes and giveaways.

November 21 – Mindfulness meditation
Come join us this week as we focus on mindfulness meditation. It’s a great way to become more engaged in the present moment, and to put some distance between yourself and your unpleasant thoughts.

November 28 – Coping with holiday and exam stress

Feynman teaching award nominations

NOMINATE YOUR FAVORITE PROFESSOR FOR THE FEYNMAN TEACHING PRIZE!!

Here’s your chance to nominate your favorite professor for the 2011-12 Richard P. Feynman Prize for Excellence in Teaching! You have from now until January 2, 2012 to submit your nomination package to the Provost’s Office to honor a professor who demonstrates, in the broadest sense, unusual ability, creativity, and innovation in undergraduate and graduate classroom or laboratory teaching.

The Feynman Prize is made possible through the generosity of Ione and Robert E. Paradise, with additional contributions from an anonymous local couple. Nominations for the Feynman Teaching Prize are welcome from faculty, students, postdoctoral scholars, staff, and alumni.

All professorial faculty of the Institute are eligible. The prize consists of a cash award of $3,500, matched by an equivalent raise in the annual salary of the awardee. A letter of nomination and detailed supporting material, including, but not limited to, a curriculum vitae, course syllabus or description, and supporting recommendation letters should be directed to the Feynman Prize Selection Committee, Office of the Provost, Mail Code 206-31, at the California Institute of Technology, Pasadena, California, 91125. Nomination packages are due by January 2, 2012.

Additional information including guidelines for the prize and FAQ may be found at http://provost.caltech.edu/FeynmanTeachingPrize. Further information can also be obtained from Karen Kerbs (626-395-6039; kkerbs@caltech.edu) or Stacey Scoville (626-395-6320; staceys@caltech.edu) in the Provost’s Office.
Letters to the Editors: Concerning recent events

There really is only one Caltech

JOHN YAO
Alumnus

This is not about Rotation, traditions, or hazing. This is not about specific actions of the administration or the undergraduates. This is about the honor system and the Caltech community—the core of Caltech unique. This is a reminder to all members of the community to embrace these ideas and in doing so improve the Institute.

But we must not forget that the honor system extends beyond academic life. The students need to re-examine whether all their actions adhere to their values, especially those that are shielded by ‘tradition’ or were previously tolerated.

The honor system embodies a trust and responsibility that must continue to be actively maintained, by the administration and by the students.

The faculty and the administration must preserve and strengthen the honor code, not circumvent it. They need to encourage the undergraduates’ sense of responsibility and ownership towards Caltech as a whole. This can only be accomplished by having students participate in the process, whether it concerns discipline, admissions, or changes to student life. Unilateral actions and punishments will only marginalize students and may result in compliance, but not in cooperation.

The faculty should not be satisfied with crude results—they teach us to strive for elegance and solutions. Such solutions protect and satisfy with crude results—

Among the undergraduates, the IHC and the ASCIT officers form the heart of student government. They are the primary line of communication with the administration and represent the interests of the students. But they are also leaders of the undergraduate population. They have the responsibility to influence student opinion, to improve relations with the administration, and to build awareness, among students about their impact on the community.

They should be the prime movers on ideas and actions to address the concerns of fellow students, as well as those of the administration. If the students want to preserve the honor system, they need actively participate and they need to support their leadership, especially in the face of difficult decisions.

In the administration, the Deans must have the ability and honest desire to work with the students. Anything less would be a non-starter. Much of the strength of the Caltech community lies in the bond between faculty and students. The administration can leverage this relationship.

The MOSH and NREAs can be actively involved with the students outside of class and are historically well-known and well-loved by the undergraduates. Other faculty members and administrators have similarly become important mentors to students. They have valuable experience, perspective, and influence. If the administration wants the cooperation of the students, they need to respect them and the honor system.

The only because it extends to all aspects of Caltech. As for us alumni, we are eager to provide help and support—after all, that is what Techers do. We are a diverse group, spanning decades of experience, representing multiple classes and of none. We all have different, even shifting views on the details of student life and how the undergraduate system should function. We need to realize that these specific issues will be the subject of an ongoing dialogue within the Caltech community. We need to accept the current incarnation of Caltech will inevitably differ from how it once was.

But we all can agree, there is a persistent part of Caltech and the honor system is part of that soul. We are all passionate about Caltech because we know the warmth of this community, and we want to ensure its continuation. The alumni can help by voicing their support for Caltech and sharing their ideas, which come with the benefit of perspective and distance.

We were not directly involved in the recent events. We are a little older and some years removed from our own time there. We can admit and understand the mistakes we made as students and we can assume the responsibilities of the administration. We should express our concerns to students just as we should share our support for Caltech, in its entirety, with the administration.

In the end, it is only together that we can preserve the honor system and the essence of Caltech.

Since graduating, I have learned how precious and rare a community like this is. It may be that the rarity of this attitude elsewhere portends its eventual demise at Caltech. Different attitudes such as the honor system simply does not work.

That is naive to trust or depend on others. That the Caltech way of life was just a dream. I could not more strongly disagree. I believe that the success of the honor system is more than a transient phenomenon.

I believe that the Caltech community can preserve the honor system, and thereby preserve itself.

I believe that Caltech was, and is, a community like no other—something special. I believe that, whatever our differences, we can all share in this goal.

John Yao, B.S. ’04

Hazing at Caltech poses a real threat

CHRISTINA KONDOS
Contributing Writer

Reading this week’s special edition of The California Tech was extremely disappointing. I feel that the writers of some of the opinion pieces showed their ignorance of real life issues. When talking to a professor this week, she told me that she had never seen a school that would have benefited more from mandatory community service. After reading the pieces in the special edition, I find I agree with her.

For me, jokes about rape lost their appeal after I worked in a women’s shelter.

Dramatic levels of binge drinking with less attractive after I spent a night in a cramped emergency room chair waiting to be told if a friend with alcohol poisoning would survive.

Sexual harassment became less fun after I experienced it first-hand.

I never thought demeaning comments about women were funny, but what do I know? I’ve spent the last few years of my life dedicated to improving human rights around the world, but I should have done more here.

Dean Kiewet is taking the correct action in that he is complying with California law.

For me, jokes about rape lost their appeal after I worked in a women’s shelter...but what do I know? I’ve spent the last few years of my life dedicated to improving human rights around the world, but I should have done more here.

Note from the Editors

The editors of The California Tech appreciate all of the feedback received over the past week. We have always strived to encourage constructive conversation regarding contentious campus issues, and would like to elicit continued dialogue between members of the administration and the student body.

One of the most widely-held concerns voiced in many of the opinion articles in the recent Special Edition of The Tech is the lack of communication between members of the Caltech community. It is likely that this lack of communication fueled some of the confusion and subsequent anger on campus.

It is our hope that future scenarios such as this one may be averted by a willingness to maintain unrestricted and open conversation among all sections of the University.

The above Letters to the Editors symbolize an important first step along this path.

H. Christina Kondos
Class of 2012

THE CALIFORNIA TECH

NOVEMBER 21, 2011

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The Muppets movie.

The Muppets' return may also help give a chance to talk to the dean. Since midterm grade reports had come out, I had evidence that I was handling my documented 53 units well. I also had a letter from the professor of my additional class stating that I was doing well. Unfortunately, when I did have a chance to talk to the dean, all she could tell me was that due to 'systems in place,' there was no chance of me getting credit for the work I had done.

Sure, no one had told me that by doing the work there was a guarantee that I would be recognized for it. But that didn't stop me from being furious. I had heard of other students with similar workloads getting their similar unoted overloadings approved right off the bat. Students whom I work with on sets; students whom I HELP with on sets. Here I was with clear evidence that I could handle the work, and the school wasn't willing to support me! What happened to fostering an environment that encourages learning? Why should I be discouraged from trying to make the most of my four years? Maybe I was a bit too presumptuous in assuming that the administration would take the time or bend the rules enough to consider my case specially. Maybe I should just have tried to handle the situation immediately, rather than take what I felt was a more reasonable course of action. I do acknowledge that I was, in effect, trying to make my own rules, making me feel as though Caltech is a little too obsessed with sticking to a stringent one-size-fits-all set of rules.

At large institutions, where faceless students are represented more by their ID numbers than their faces, it makes sense to simply use measurements and solid facts to determine a student's ability. But here at Caltech, don't we have a small enough student body that we can stand to give each overload a face and a chance to defend itself? Of course, there are cases where people who apply for overloads simply should not be able to handle them. But I feel like Caltech needs to modify their system so that students who can demonstrate their abilities to handle large workloads can be read approved. Measuring students by the metric of GPA is, as in my case, not necessarily a determinant of their ability to handle the workload of the present.

After all, GPA is a fact, but it is in fact a basis on the past that does not represent a student's ability in every possible facet. If I simply do not understand quantum mechanics, does that necessarily mean that I'm going to do badly in the hopefully practical computer science class I'm adding? Similarly, Caltech's unifying system is not perfect, as any student can attest to. 62 units do not actually mean 62 hours of work a week all the time for every student. Using the same measuring bar for every case of requested overloads due to sticking to a 'system' is hurting students who don't happen to fit nicely into some guidelines rigidly set by administrators who, to their credit, are trying their best to cater to the 'general case.'

I would love to go into more detail, but I have 62 units of work to get back to, 53 of which I'm actually getting credit for.
The Tech meets with actors from The Muppets

AMOL KAMAT
Sports Editor

For the first time since 1999, the Muppets will be starring in a feature length film. Opening November 23, “The Muppets” is a story about reuniting old friends. For those of us who grew up with the Muppets, we will certainly feel reunited as well. But, what about introducing a new generation of kids to the Muppets? In an interview at the Muppets press junket, Kermit the Frog seemed to think that this would be quite simple.

“Well it’s easy, you just say hi there, my name is Kermit, nice to meet you,” Kermit joked, before getting serious. “That’s kind of what we’re doing, though. I think this film serious. “That’s kind of what we’re doing, though. I think this film serious.”

Jason Segel, who produced, stars in, and co-wrote “The Muppets,” added, “I would feel very sad if there was somebody out there who did not know who moi was and did not have the opportunity to be entertained by moi.”

“The Rainbow Connection”: “I would say the same is true of ‘Mahna Mahna,’” added Walter, “it came to directing a Muppet movie in which there is a puppet musical.” Those puppets were made by The Jim Henson Company. Segel cites the Muppets as his first comic influence and the reason for his love of puppetry.

“I love [puppets],” said Segel, “it definitely is an art form. The honest answer is that I am a super weird puppet guy. I love the Muppets and the Tim Burton movies. It’s just a tone that I like. These things take place in a world that we exist in, and so you feel like maybe it could happen in real life.”

Segel and Stoller enlisted James Bobin ("Flight of the Conchords") to direct. Bobin, a first time feature-film director, felt that his time on "Flight of the Conchords" was helpful when it came to directing “The Muppets.”

“Comedy for a long time has been cynical, and I love the idea now of just a tone that I got from Burton movies. It’s weird puppet guy. I wasn’t mean, and that helped me tonally.”

"Flight of the Conchords," it seems, was very influential in the making of this film. Bret McKenzie, creator, co-writer, executive-producer, and star of Conchords, was the music supervisor for “The Muppets” and also wrote and produced three original songs for the film. Overall, “The Muppets” is a successful throwback to an older style of movie making that remains relevant in the modern world.

Kermit described it best when talking about his new version of ‘The Rainbow Connection’: “I hope it’s still a relevant song, and I think people still like it. It’s nice to have a chance to reintroduce it to new folks, ya know?”

“I would say the same is true of ‘Mahna Mahna,’” added Walter, the newest addition to the Muppets ensemble.

“Those lyrics are just as pertinent today as they were in the seventies.”

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AMANDA SANTORA

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• Mechanical Engineering (ME)

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• Marine Science (MarSE)
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• Mechanical Engineering (ME)

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Email: admissions@kaust.edu.sa
Phone: +966 (2) 808-3428/9

Today’s Puzzle: Crossword

Across
1. Distort
5. Symbol
9. Form of transport
12. Beer
13. Not any
14. Division of quantity
16. Satire
17. Vista
18. Conflagration
19. Surface boundary
20. Electrically charged particle
21. Frequently
22. Employment
24. Unhappy
26. Finish
27. Health resort near a spring
30. Compete
31. Overt
33. Young domestic cattle
35. Consume
36. Long narrative poem
40. Change
41. Armed conflict
42. Wetland
43. Inert gas
44. Stray
45. Team spirit
46. Ripped
48. Snakelike fish
49. Coniferous tree
50. Vegetable
53. Roman deity
54. Shopping center
56. Unsound
58. Guided
59. Chances
63. Settled a debt
64. Affirm
66. Expect
67. Land measure
68. Circular band
69. Transport back and forth
70. Beverage
71. Instance or example
72. Woody plant
75. Vegetable

Down
1. Part of a hospital
2. Excited
3. Regenerate
4. Be nosey
5. Call forth
6. Metal money
7. Single
8. Novel
9. Afficionado
10. Join together
11. Sea nymph
12. Fib
15. Look after
20. Part of the eye
21. Poem
23. Finished
24. Rise upward
25. Appropriate
27. Examine closely
28. Pallid
29. Singing voice
32. Close
34. Part of a volcano
35. Part of a cereal plant
36. Supplicate
37. Small island
39. Mandate
41. Small bird
42. Gangster’s girlfriend
44. Epoch
45. Fermented honey and water
47. Choose, usually followed by for
48. Come out into view
50. Insect, between adult and larva
51. Oedan
52. Albace
53. Move something down
55. Move something down
57. Notion
58. Part of a camera
59. Chances
60. Challenge
61. Desperate
62. Pig pen
64. Part of a circle
65. By way of
66. Toward the stern
68. Circular band
69. Transport back and forth
70. Beverage
71. Instance or example
72. Woody plant

Upcoming Events:
The Caltech Y

November 22: Science Policy Lunch with Dr. Baltimore. Space is limited. RSVP required.

November 24: Dinner in the Park. Join a group of Caltech students at Central Park in Pasadena for Union Station’s Dinner in the Park - Community Thanksgiving Meal.

November 30: Social Activism Speakers Series with Jeremy Scahill. Ramo Auditorium, 7:30-9:30 PM

Jeremy Scahill is one of the few US journalists who independently ventured into Afghanistan and was not embedded with US military forces or with the Afghanistan government. He returned from his trip with fascinating stories derived from first-hand observations, interviews, and videos about the real status of the war in Afghanistan.
Caltech womens’ basketball team loses season opener to Pacific University

In their season opener, the Caltech women’s basketball team was dominated by Pacific University (Oregon), losing 75-25. The Beavers’ defense held strong early in the game, holding them to just seven points in as many minutes. Unfortunately, the Caltech offense could not keep up, remaining pointless until Rachel Hess made a jumper eight minutes in. Of course, by this time, the Pacific University offense had woken up and went on a scoring rampage, and the Beavers limped into halftime down 41-7.

Determined to make it to double digits, the Caltech offense came out swinging in the second half, scoring six points in the first six minutes. They ultimately put up 18 second half points, which is much more than seven. Alas, the Caltech defense still could not contain the explosive Pacific offense, and they soon extended their advantage to 50 points, which they maintained until the final buzzer.

The day was not all bad, however. Individual efforts against this strong Pacific team were quite impressive. Rachel Hess scored a game high 13 points and Teri Juarez had a game high 10 rebounds. The relatively young Beaver team seemed understandably nervous in this opening game, but some of the coaching decisions were just confounding. Coach Marbut’s decision to have Susan Ballentine inbound the ball with a hail mary pass on several occasions, for example, not only never worked, but it made the Beavers look rather silly and inexperienced (although the calls for pass interference from the Pacific fans sort of made up for the embarrassment).

Perhaps more embarrassing than the actual game was our lack of mastery over the scoreboard, shot clock, and buzzer system. On numerous occasions, the game was delayed to fix discrepancies between the two shot clocks. When the buzzer for the shot clock did go off, the Athletics staff had trouble turning it off. This made for a rather unpleasant environment (it also angered some of the Pacific fans beyond belief, so I guess it was worth it).

Hopefully the team can rebound (basketball pun +1) fro this loss. They certainly showed promise at times, and if they can keep that up, I don’t think it’s inconceivable for them to get at least one win this season. The women take on MIT this Friday at 8:00 pm at home.

Weekly Scoreboard
November 19, 2011

Women’s Basketball vs. Pacific (Ore.)
L, 75-25 Final

Men’s Basketball at Vanguard
L, 78-63 Final

November 12, 2011

Men’s Water Polo at La Verne
L, 19-12 Final
Blackout!

Lecture:
Prof.
$\alpha \land \alpha^2 \land : x \rightarrow \beta$

Recitation:
The answers are:
1) 2π\text{r}
2) $A \land B = \emptyset$
3) $\int_{0}^{\pi}(\cos x)dx = 7c$

Office Hours:
Let me Xerox the solution set for you!

Woo Hoo!

Dilbert vs. Garfield

By Greg Marleens

For more photos, videos, and archives of previous issues, check out the Tech website!

tech.caltech.edu