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REalVIEW

a monthly realty news digest

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Dear Readers,

REalVIEW is a monthly news digest bringing to our clients and well-wishers news updates on major developments in the realty industry . The periodical will keep the readers updated on the significant changes and trends affecting real estate development within the country as well as globally, thus helping them in taking informed and calculated investment decisions.

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V. Sunil Kumar
Managing Director
Asset Homes

Study yields a new scale of earthquake understanding

Nanoscale knowledge of the relationships between water, friction and mineral chemistry could lead to a better understanding of earthquake dynamics, researchers said in a new study. Engineers at the University of Illinois at Urbana-Champaign used microscopic friction measurements to confirm that, under the right conditions, some rocks can dissolve and may cause faults to slip.

The study, published in the journal Nature Communications, closely examines how water and calcite -- a mineral that is very common in the Earth's crust -- interact at various pressures and groundwater compositions to influence frictional forces along faults.

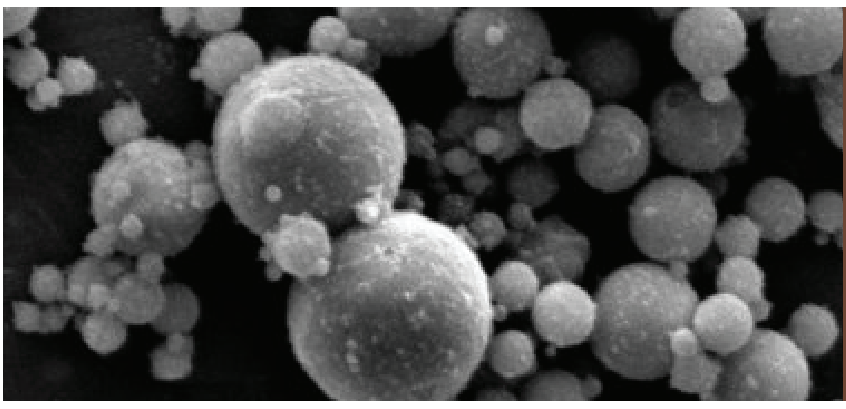
"Water is everywhere in these systems," said Rosa Espinosa-Marzal, a civil and environmental engineering professor and co-author of the study. "There is water on the surface of minerals and in the pore spaces between mineral grains in rocks. This is especially true with calcite-containing rocks because of water's affinity to the mineral."

According to the researchers, other studies have correlated the presence of water with fault movement and earthquakes, but the exact mechanism remained elusive. This observation is particularly prevalent in areas where fracking operations are taking place -- a process that involves a lot of water.

The study focuses on calcite-rich rocks in the presence of brine -- naturally occurring salty groundwater -- along fault surfaces. The rock surfaces that slide past each other along faults are not smooth. The researchers zoomed in on the naturally occurring tiny imperfections or unevenness on rocks' surfaces, called asperities, at which friction and wear originate when the two surfaces slide past each other.

"Our research suggests that it might be possible to mitigate earthquake risk by purposely changing brine compositions in areas that contain calcite-rich rocks. This consideration could be beneficial in areas where fracking is taking place, but this concept requires much more careful investigation," Espinosa-Marzal said.

Courtesy: https://www.sciencedaily.com/releases/2018/06/180627160212.htm



Cementless fly ash binder makes concrete 'green'

Rice University engineers have developed a composite binder made primarily of fly ash, a byproduct of coal-fired power plants, that can replace Portland cement in concrete.

The material is cementless and environmentally friendly, according to Rice materials scientist Rouzbeh Shahsavari, who developed it with graduate student Sung Hoon Hwang.

Fly ash binder does not require the high-temperature processing of Portland cement, yet tests showed it has the same compressive strength after seven days of curing. It also requires only a small fraction of the sodium-based activation chemicals used to harden Portland cement.

More than 20 billion tons of concrete are produced around the world every year in a manufacturing process that contributes 5 to 10 percent of carbon dioxide to global emissions, surpassed only by transportation and energy as the largest producers of the greenhouse gas.

Manufacturers often use a small amount of silicon- and aluminum-rich fly ash as a supplement to Portland cement in concrete. "The industry typically mixes 5 to 20 percent fly ash into cement to make it green, but a significant portion of the mix is still cement," said Shahsavari, an assistant professor of civil and environmental engineering and of materials science and nanoengineering.

"Our work provides a viable path for efficient and cost-effective activation of this type of high-calcium fly ash, paving the path for the environmentally responsible manufacture of concrete. Future work will assess such properties as long-term behavior, shrinkage and durability."

Shahsavari suggested the same strategy could be used to turn other industrial waste, such as blast furnace slag and rice hulls, into environmentally friendly cementitious materials without the use of cement.

Courtesy: https://www.sciencedaily.com/releases/2018/06/180618113041.htm

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Buildings as power stations work: They generate more energy than they consume, data shows

The UK's first energy-positive classroom, designed with research expertise from Swansea University, generated more than one and a half times the energy it consumed, according to data from its first year of operation, the team has revealed.

The findings were announced as the researchers launched the next phase of their research, gathering data and evidence on an office building, constructed using similar methods.

This new building, known as the Active Office, points the way to a new generation of low-carbon offices which produce their own supply of clean energy.

It was designed by SPECIFIC, a UK Innovation and Knowledge Centre led by Swansea University.

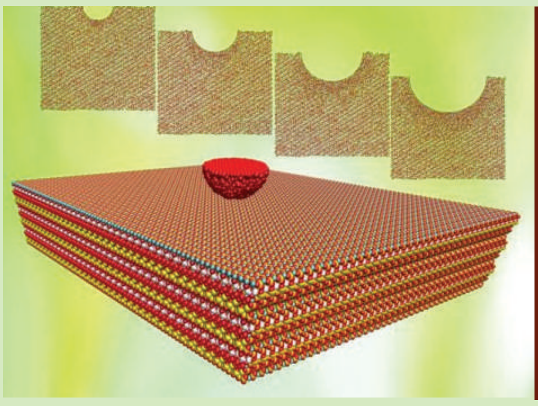
The Active Office combines a range of innovative technologies that will enable it to generate, store and release solar energy in one integrated system, including:

- A curved roof with integrated solar cells -- showing the flexible nature of the laminated photovoltaic panel;
- A Photovoltaic Thermal system on the south facing wall -- which is capable of generating both heat and electricity from the sun in one system
- Lithium ion batteries to store the electricity generated and a 2,000 litre water tank to store solar heat

Energy positive buildings could benefit the country significantly. A 2017 analysis showed that it would mean:

- Lower energy costs for the consumer
- Less need for peak central power generating capacity and associated reduction in stress on the National Grid, leading to improved energy security
- Reduced carbon emissions

Courtesy: https://www.sciencedaily.com/releases/2018/06/180620193729.htm



Here's a tip: Indented cement shows unique properties

Rice University scientists have determined that no matter how large or small a piece of tobermorite is, it will respond to loading forces in precisely the same way. But poking it with a sharp point will change its strength.

Tobermorite is a naturally occurring crystalline analog to the calcium-silicate-hydrate (C-S-H) that makes up cement, which in turn binds concrete, the world's most-used material. A form of tobermorite used by ancient Romans is believed to be a key to the legendary strength of their undersea concrete structures.

The finely layered material will deform in different ways depending on how standard forces -- shear, compression and tension -- are applied, but the deformation will be consistent among sample sizes.

Simulations revealed three key molecular mechanisms at work in tobermorite that are also likely responsible for the strength of C-S-H and other layered materials. One is a mechanism of displacement in which atoms under stress move collectively as they try to stay in equilibrium. Another is a diffusive mechanism in which atoms move more chaotically. They found that the material maintains its structural integrity best under shear, and less so under compressive and then tensile loading.

More interesting to the researchers was the third mechanism, by which bonds between the layers were formed when pressing a nanoindenter into the material. A nanoindenter is a device (simulated in this case) used to test the hardness of very small volumes of materials. The high stress at the point of indentation prompted local phase transformations in which the crystalline structure of the material deformed and created strong bonds between the layers, a phenomenon not observed under standard forces. The strength of the bond depended on both the amount of force and, unlike the macroscale stressors, the size of the tip.

"There is significant stress right below the small tip of the nanoindenter," Shahsavari said. "That connects the neighboring layers. Once you remove the tip, the structure does not go back to the original configuration. That's important: These transformations are irreversible.

Courtesy: https://www.sciencedaily.com/releases/2017/07/170719173712.htm

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