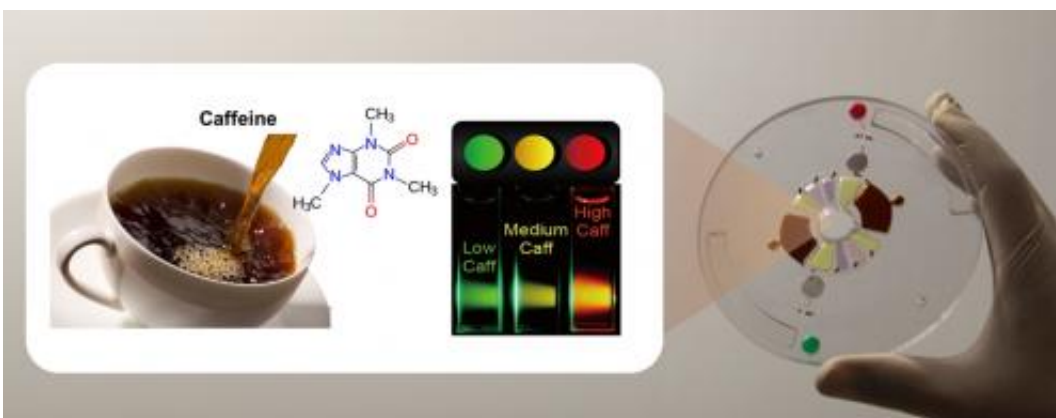


Caffeine 'traffic light': Do you want to know how much caffeine is in your drink?

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This is a fully automated caffeine detection kit: microfluidics device. Credit: UNIST

(Phys.org) —A team of researchers led by Prof. Young-Tae Chang from National University of Singapore and Prof. Yoon-Kyoung Cho from Ulsan National Institute of Science and Technology (UNIST), Korea, developed a fluorescent caffeine detector and a detection kit that lights up like a traffic light when caffeine is present in various drinks and solutions.

The research work was published in *Scientific Reports* on July 23, 2013.

Caffeine drinks are ubiquitous and it would be unimaginable for many of us to go a day without caffeine. But certainly one begins to worry

about how much caffeine one consumes every day.

Here is a convenient way to see how much caffeine is in your drink. The novel caffeine sensor, named Caffeine Orange can be used for handy visualization of the amount of caffeine in your coffee or [energy drinks](#).

With the non-toxic caffeine detection kit using Caffeine Orange, naked-eye sensing for various caffeine concentrations is possible based on color changes upon [irradiation](#) with the detection kit, and emitting a light to your drink with a green laser pointer.

Solutions with high caffeine concentrations turn red while solutions with moderate and low caffeine concentrations turn yellow and green, respectively when the drink is irradiated with a laser pointer.

The novel fluorescent caffeine detector, called Caffeine Orange was developed by the team led by Prof. Chang from National University of Singapore. To fully utilize traffic-light caffeine sensor, they need to extract caffeine from solutions. An [automated system](#) by incorporating microfluidics technique developed by the UNIST research team, lab-on-a disc, was applied to extract and to measure caffeine.

"Applying lab-on-a-disc technology to real life application with the novel caffeine sensor is very meaningful," said Prof. Cho. "We will continue to develop new sensors applicable to various materials utilizing lab-on-a-[chip technology](#)."

Beverages containing caffeine, such as coffee, tea, soft drinks, and energy drinks, enjoy great popularity around the world while various studies have raised both positive and negative health related concerns.

But it is clear that caffeine overdose can lead to caffeine intoxication, with symptoms such as anxiety, irregular heartbeat, and insomnia. In

extreme cases, a large overdose can lead to hallucinations, depression, or even death.

"You can use this caffeine detection kit as a '[traffic-light](#) caffeine amount designator'," said Prof. Chang. "The reddish orange color indicates a stop sign for people who cannot uptake caffeine, while yellow and green indicate a warning signal and safe zone respectively."

In addition, due to its abundant existence in domestic wastage, caffeine was found to be an important indicator of natural water system pollution by domestic drain.

The novel detector, Caffeine Orange, exhibits a 250-fold fluorescence enhancement upon caffeine activation and high selectivity responding to caffeine analogs that have similar chemical structures.

The caffeine sensor and [detection kit](#) not only to enhance product safety during extensive consumption of [caffeine](#), but also serve as a practical path of uniting science with real life.

More information: The more detailed information is reported in the article "Make Caffeine Visible: A Fluorescent Caffeine "Traffic Light" Detector". [www.nature.com/srep/2013/13072 ... /full/srep02255.html](http://www.nature.com/srep/2013/13072.../full/srep02255.html)

Provided by Ulsan National Institute of Science and Technology

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