Technology detecting RNase activity

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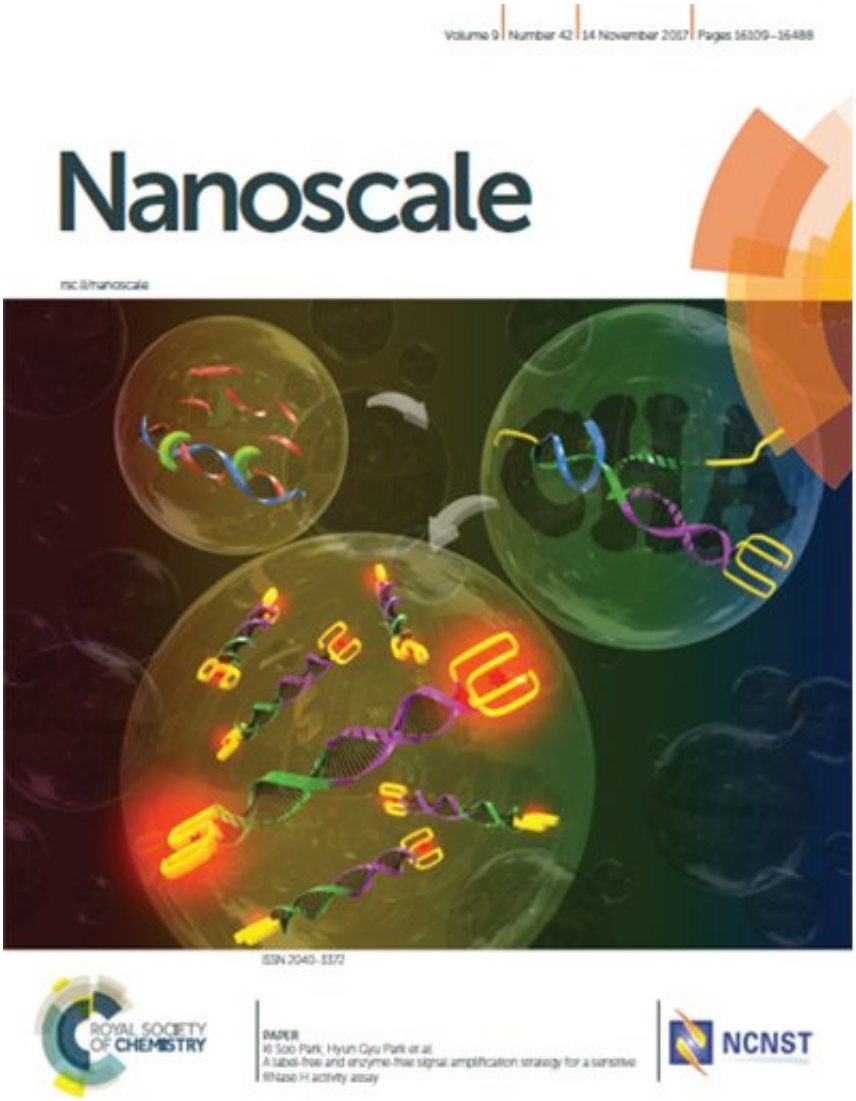

Nanoscale (Issue 42, 2017). Credit: KAIST

A KAIST research team of Professor Hyun Gyu Park at Department of Chemical and Biomolecular Engineering developed a new technology to detect the activity of RNase H, a RNA degrading enzyme. The team used highly efficient signal amplification reaction termed catalytic hairpin assembly (CHA) to effectively analyze the RNase H activity. Considering that RNase H is required in the proliferation of retroviruses such as HIV, this research finding could contribute to AIDS treatments in the future, researchers say.

This study led by Ph.D. candidates Chang Yeol Lee and Hyowon Jang was chosen as the cover for *Nanoscale* (Issue 42, 2017) published in 14 November.

The existing techniques to detect RNase H require expensive fluorophore and quencher, and involve complex implementation. Further, there is no way to amplify the signal, leading to low detection efficiency overall. The team utilized CHA technology to overcome these limitations. CHA amplifies detection signal to allow more sensitive RNase H activity assay.

The team designed the reaction system so that the product of CHA reaction has G-quadruplex structures, which is suitable to generate fluorescence. By using fluorescent molecules that bind to G-quadruplexes to generate strong fluorescence, the team could develop high performance RNase H detection method that overcomes the limitations of existing techniques. Further, this technology could screen inhibitors of RNase H activity.

The team expects that the research finding could contribute to AIDS treatment. AIDS is disease caused by HIV, a retrovirus that utilizes reverse transcription, during which RNA is converted to DNA. RNase H is essential for reverse transcription in HIV, and thus inhibition of RNase H could in turn inhibit transcription of HIV DNA.

Professor Park said, "This technology is applicable to detect various enzyme activities, as well as RNase H activity." He continued, "I hope this technology could be widely used in research on enzyme related diseases."

More information: Chang Yeol Lee et al, A label-free and enzyme-free signal amplification strategy for a sensitive RNase H activity assay, *Nanoscale* (2017). DOI: 10.1039/c7nr04060a

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