

# Novel diagnostic strip for gout patients using a single teardrop

May 3 2017

---

A novel diagnostic strip for gout patients using a single teardrop has been announced by Korea Advanced Institute of Science and Technology (KAIST) research team. This technology analyzes biological molecules in tears for a non-invasive diagnosis, significantly reducing the time and expense previously required for a diagnosis.

The research team under Professor Ki-Hun Jeong of the Department of Bio and Brain Engineering succeeded in developing an affordable and elaborate [gout](#) diagnostic strip by depositing metal nanoparticles on paper. This technology can not only be used in diagnostic medicine and drug testing, but also in various other areas such as field diagnoses that require prompt and accurate detection of a certain substance.

Gout induces pain in joints due to needle-shaped [uric acid](#) crystal build up. In general, therapeutic treatments exist to administer pain relief, stimulate uric acid discharge, and uric acid depressant. Such treatments work for temporary relief, but there have significant limitations. Thus, patients are required to regularly check uric acid concentrations, as well as control their diets. Therefore, simpler ways to measure uric acid would greatly benefit gout control and its prevention in a more affordable and convenient manner.

Existing gout diagnostic techniques include measuring uric acid concentrations from blood samples or observing uric acid crystals from joint synovial fluid under a microscope. These existing methods are invasive and time consuming. To overcome their limitations, the

research team uniformly deposited gold nanoislands with nanoplasmonics properties on the surface of paper that can easily collect tears.

Nanoplasmonics techniques collect light on the surface of a metal nanostructure, and can be applied to disease and health diagnostic indicators as well as for genetic material detection. Further, metals such as gold absorb stronger light when it is irradiated, and thus can maximize light [concentration](#) on board surfaces while maintaining the properties of paper. The developed metal nanostructure production technology allows the flexible manufacturing of nanostructures on a large surface, which in turn allows flexible control of light concentrations.

The research team grafted surface-enhanced Raman spectroscopy on paper diagnostic strips to allow uric acid concentration measurements in teardrops without additional indicators. The measured concentration in teardrops can be compared to blood uric [acid](#) concentrations for diagnosing gout.

Professor Jeong explained, "Based on these research results, our strip will make it possible to conduct low-cost, no indicator, supersensitive biological molecule analysis and fast field diagnosis using tears." He continued, "Tears, as well as various other bodily fluids, can be used to contribute to disease diagnosis and physiological functional research."

Ph.D. candidate Moonseong Park participated in the research as the first author of the paper that was published in the online edition of *ACS Nano* on December 14, 2016. Park said, "The strip will allow fast and simple field diagnosis, and can be produced on a large scale using the existing semiconductor process."

**More information:** Moonseong Park et al. Plasmonic Schirmer Strip for Human Tear-Based Gouty Arthritis Diagnosis Using Surface-

Enhanced Raman Scattering, *ACS Nano* (2017). DOI: [10.1021/acsnano.6b06196](https://doi.org/10.1021/acsnano.6b06196)

Provided by The Korea Advanced Institute of Science and Technology (KAIST)

Citation: Novel diagnostic strip for gout patients using a single teardrop (2017, May 3) retrieved 27 April 2024 from <https://phys.org/news/2017-05-diagnostic-gout-patients-teardrop.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.