

New microscope might see beneath skin in 4-D

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A new type of laser scanning confocal microscope (LSCM) holds the promise of diagnosing skin cancer in a single snapshot.

Typical LSCMs take 3-D images of thick [tissue samples](#) by visualizing thin slices within that tissue one layer at a time. Sometimes scientists supplement these microscopes with spectrographs, which are devices that measure the pattern of wavelengths, or "colors," in the light reflected off of a piece of tissue. This pattern of wavelengths acts like a fingerprint, which scientists can use to identify a particular substance within the sample. But the range of wavelengths used so far with these devices has been narrow, limiting their uses.

Not so with the new microscope developed by physicists from the Consiglio Nazionale delle Ricerche (CNR) in Rome, and described in a paper accepted to the AIP's new journal *AIP Advances*. Unlike other combination "confocal microscope plus [spectrograph](#)" devices, the new machine is able to gather the spectrographic information from every point in a sample, at a wide range of wavelengths, and in a single scan. To achieve this, the authors illuminate the sample with multiple colors of [laser light](#) at once – a sort of "laser rainbow" – that includes visible light as well as infrared.

This allows scientists to gather a full range of information about the wavelengths of light reflected off of every point within the sample. Using this method, the researchers took high-resolution pictures of the edge of a silicon wafer and of metallic letters painted onto a piece of

silicon less than half a millimeter wide. They also demonstrated that it is possible to apply this technique to a tissue sample (in this case, chicken skin) without destroying it. With further testing, the researchers say the [microscope](#) could be used to detect early signs of melanoma; until then, it may be useful for non-medical applications, such as inspecting the surface of semiconductors.

More information: "Supercontinuum ultra wide range confocal microscope for reflectance spectroscopy of living matter and material science surfaces" by Stefano Selci et al. is published in *AIP Advances*.

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