



KEITH BIRMINGHAM / STAFF

WORKING WITH LIGHT: Changhuei Yang, assistant professor of electrical engineering and bioengineering at Caltech, works at the technology facilities Wednesday with equipment that sends light through tissue.

A clear sign of progress

Caltech researcher finds way to pass light through skin

By Elise Kleeman
Staff Writer

PASADENA — Recipe for see-through chicken:

Combine one green laser, one holographic crystal and a sliver of store-bought chicken breast. Mix with a hearty dash of Caltech know-how.

The result? A way to make light pass through chicken — and possibly one day human tissue — as if it were clear as a jellyfish.

“Even though the technology has been around for at least 20 years, no one thought it would work,” said Changhuei Yang, a Caltech electrical engineer. “We were kind of foolhardy enough to try it. When we did the experi-

ment, we were pleasantly surprised that it worked out.”

Usually when light strikes skin, it ricochets off cells’ inner contents, scattering quickly.

But Yang, working with a team of Caltech, Massachusetts Institute of Technology and Swiss scientists, showed he could map the pattern of scattered light using a holographic crystal.

He then used the crystal as a road map to send the light back along its winding path until it created a focused beam as deep as one-fifth of an inch beneath the surface.

The process, he said, is similar to breaking a rack of billiard balls, then rewinding time to watch the balls rearrange into a triangle.

Though the method is still in its earliest stages, Yang predicts it could one day peer more than an inch beneath human skin. Applications would include spotting diseases, activating light-sensitive cancer drugs at tumor sites and powering implants with a beam of light instead of bulky batteries.

“If we could somehow come up with a way to deliver energy, we could have miniature implants,” Yang said.

“I think it’s very interesting and useful work,” said Brian Applegate, a biomedical engineer at Texas A&M University. “It’s very promising. I do agree it has lots of potential applications.”

Other methods for shining light into tissues have reached their

full potential at shallow depths or produce only low resolution images, Applegate said.

Although Yang’s techniques hold promise for overcoming both of those limitations, there are still hurdles.

“Our technique right now is pretty slow, it takes a while to record our pattern in our hologram,” said Emily McDowell, a bioengineering graduate student working on the project.

The team has only tested its method on dead tissue so far, but living tissues, laced with flowing blood and vibrating ever so slightly, could also pose a challenge.

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