FELICE FRANKEL: Can you tell which of these images were generated by AI? What about these? And which one of these images looks more real? Whether we recognize it or not, AI is everywhere-- on our phones, in our schools, on our televisions, in the news. How do we know what's real and what's artificial? And most importantly, what does this mean for science photographers and communicators like me or you?

Hi, I'm Felice Frankel. I'm a research scientist and science photographer at MIT. Science photography plays a crucial role in documenting discoveries, combatting misinformation, and building public trust in science. And just as important, the process of creating the images encourages a deeper understanding of your work for you, the researcher.

I expand on this in my course, Making Science and Engineering Pictures on MIT OpenCourseWare linked in the description below. Since the launch of that course, we've witnessed an explosion of new technologies, including AI image creation tools like ChatGPT, Midjourney, and even something called Nano Banana. In this video, we'll explore key questions about these generative AI models and their legitimacy in scientific research. But first, let's set the stage and talk about what we mean when we talk about photography.

If you think about it, taking a photograph is, in fact, making a representation of reality. The photograph is not the thing itself, but a translation of the thing into a two-dimensional image. In essence, science photographers manipulate reality up to a point. Think about that.

For example, the way I crop an image-- I have to decide on what to leave in the image, and just as important, what to leave out. My intention is to be a translator of reality, not an interpreter, to simplify the information, to make the science accessible. I want to clearly represent exactly what the subject of the photo is without altering its meaning.

For instance, for an image of a yeast colony in a Petri dish, we might choose to zoom in and edit out the Petri dish, since the colony is the subject of the image. The data in this study is the morphology of the colony, and I'm not changing that.

We have observed over the years other forms of manipulations that have become accepted. Perhaps you've seen colorized versions of Old? Black and white TV shows.

[VIDEO PLAYBACK]

- It's *Lucy the Chocolate Factory,* in color for the very first time.

[END PLAYBACK]

That's manipulating images in order to modernize them for contemporary audiences. But that doesn't necessarily mean these shows have been falsified or are misrepresenting the original intent of their producers. Along those lines, almost all astronomical images we see have been manipulated, colorized, or enhanced. This not only brings attention to the extraordinary details of our universe, but it also gives us information about what the structure is made of through the choices of color.

And taking the idea further, the tools we decide to use will also affect the final image and can be considered a manipulation. Look at this color enhanced image from the Hubble telescope made with visible light, and compare it to a more recent image, also color enhanced, made with the James Webb telescope using the infrared. The latter shows more detail. Does that mean that the Hubble images are not honest? Of course not. It's just something to think about.

Today's AI models are not consistently producing believable images, but they will continue to improve. And soon, it may be nearly impossible to distinguish them from real scientific photographs.

[VIDEO PLAYBACK]

- The so-called AI slop all over the internet these days--

- Angela Carter here live--

- --is getting less sloppy.

- --disaster. Just kidding. I'm not real.

- --with hyper-realistic AI-generated sham news clips circulating.

- These were AI-generated, and it was hard for people online to tell whether they were authentic or AI-generated.

[END PLAYBACK]

FELICE FRANKEL: After seeing all the latest AI-generated images, I began to question the relevance of my work photographing science and engineering, which led me to write an essay for *Nature* magazine in February 2025. For the article, I experimented with tools like Midjourney and ChatGPT to compare the AI-generated images to one of my most popular science photographs of nanocrystals, showing the work of MIT Nobel laureate Moungi Bawendi.

Here, we are looking at two images I made of Moungi's work that show vials containing different sizes of nanocrystals fluorescing under UV light. Each vial contains cadmium selenide crystals that fluoresce at different wavelengths depending on their size.

Keep in mind that collaboration with the researcher is vital in this process. There should be a conversation between the photographer and the researcher to determine the most accurate, honest, and communicative image. Moungi preferred the second, more straightforward image.

Now, look at the ChatGPT image. Pretty different from the others, wouldn't you say? Here's the prompt I used. Create a photo of Moungi Bawendi's nanocrystals in vials against a black background fluorescing at different wavelengths depending on their size when excited with UV light. So what differences do you notice?

While the AI-generated image might seem visually appealing, pretty cartoon-like, it fails to accurately capture the research. It introduces inaccuracies. For example, the model is mixing colors in the vials, missing the point that each vial contains only one color.

And the more telling problem is that the model is creating colored dots. Why, you may ask? Possibly because the LLM from which it gets its information on occasion use the words "quantum dots" to replace the word nanocrystals. Also, notice the model decided to place a few of the dots on the surface of the table. Why? Possibly for an aesthetic reason, but it's not exactly my aesthetic.

Just for fun, I decided to try again six months later with the identical prompt. Pretty amazing how close the image is getting to my real image, wouldn't you say?

Now imagine a photographer or photo editor who doesn't have a full understanding of their subject, or didn't consult an expert to verify that this image isn't an accurate representation of nanocrystals. Putting wrong information out there can do real damage to people's understanding of complicated concepts. That's the risk we're currently taking with AI-generated images.

An AI-generated image, by definition, doesn't record a thing, and therefore, should never be considered scientific documentation. An AI-generated image uses information in the form of data from large language models and decides how to respond to a prompt. Training scientists in the ethics of visual communication is now more critical than ever before.

It is clear that AI-generated images are part of our future. For this reason, I think it's important that we create guidelines that require researchers to respond to the following questions. Has this image been AI-generated? If so, the image should be labeled and contain metadata to indicate it is AI-generated.

What AI-generating model and version did you use? There are updates to these programs all the time, so be as specific as possible. What prompts did you use to generate this image? Keep track of the prompts and reprompts used to produce your images. Did you include an image to help with the prompt? If so, you should include that image and credit as well.

AI is evolving, and so are our questions about it and how we respond to those questions. But let's go back to one question I think we can answer. Is there still a place for a science photographer in the age of AI?

I posed this question to an AI model, and this is what it said. A science photographer who documents scientific subjects plays a unique role in the world of AI-generated images, providing expertise, authenticity, and a critical perspective that is especially relevant in fields where accuracy and representation matter.

In short, science photographers remain crucial in the AI era, guiding responsible practices, providing high-quality input data, and ensuring that AI-generated images serve to inform and educate rather than mislead. Sounds good to me.