To build a better semiconductor, first identify its defects

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Gallium oxide is a remarkable wide-bandgap semiconductor material. Put simply, that means it could potentially be used to create electronic devices that can operate under extreme conditions – such as when exposed to high heat and high doses of radiation. But before it can find widespread use, we need to know more about it.

"To make the best use of this material, we need to understand atomic-level defects in its crystalline structure," says Ge Yang, an assistant professor of nuclear engineering at NC State.

And that's exactly what Yang and his collaborators have done. In a recent paper, "Low temperature cathodoluminescence study of Fe-doped β-Ga_2O_3," published in *Materials Letters*, the researchers were able to identify a range of defects that can be found in the material.

"Once you know what defects are present in a material, you can figure out how those defects affect the material's electronic properties – which we're working on now," Yang says. "We can then find ways to either induce or reduce these defects, depending on which properties are desirable for a specific application. We're working on that as well."

More information: Ibrahim Hany et al. Low temperature cathodoluminescence study of Fe-doped β-Ga_2O_3, *Materials Letters* (2019). DOI: 10.1016/j.matlet.2019.126744

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