Scilight

NEWS | JUNE 12 2020

Generating tunable vacuum ultraviolet coherent light sources without phase matching FREE

Savannah Mandel

Scilight 2020, 241111 (2020)
https://doi.org/10.1063/10.0001465

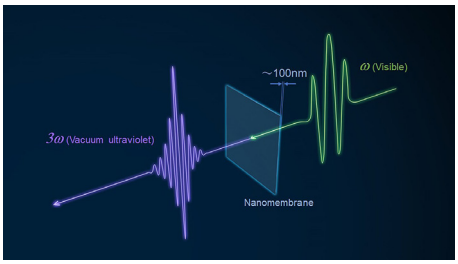
Scilight

12 June 2020

Generating tunable vacuum ultraviolet coherent light sources without phase matching

Savannah Mandel

Researchers generate tunable vacuum ultraviolet coherent light sources using dielectric nanomembranes and observe light intensities suitable for spectroscopic applications.



Tunable vacuum ultraviolet (VUV) coherent light sources have important spectroscopic applications, but their potential has been limited by existing laser technology and reliance on nonlinear crystals, which can be difficult to obtain. To optimize the spectroscopic applications of VUV coherent light sources, researchers are working to streamline VUV generation and experimental setups.

Conventional methods for VUV generation require the use of phase matching to increase light intensity. Konishi et al. investigated whether phase matching was truly necessary for generating VUVs and tested an experimental setup that may lead to more practical applications.

By adjusting the thickness of the nonlinear medium, the authors learned they could generate VUVs with an intensity suitable for most spectroscopic applications without the use of phase matching.

Using a commercially available nanomembrane of only a few hundred nanometers thick as the nonlinear medium, the authors were able to generate VUVs tunable over a broad range by adjusting the incident wavelength.

“It is possible to generate VUV coherent light with a practical intensity by focusing a femtosecond laser on a commercially available nanomembrane in a vacuum chamber,” said author Kuniaki Konishi. “This dramatically simplifies the experimental setup compared to the conventional generation method.”

The authors identified laser angle-resolved photoemission spectroscopy, or ARPES, as an application that may benefit from this method of generating VUVs.

“We believe that the discovery of dielectric nanomembranes as new nonlinear media for practical VUV generation is an important advance for nonlinear optics and photonics,” said Konishi.

Source: “Tunable third harmonic generation in the vacuum ultraviolet region using dielectric nanomembranes,” by Kuniaki Konishi, Daisuke Akai, Yoshio Mita, Makoto Ishida, Junji Yumoto, and Makoto Kuwata-Gonokami, *APL Photonics* (2020). The article can be accessed at https://doi.org/10.1063/5.0008568.