The Pennsylvania State University, N-338 Millennium Science Complex, University Park, PA 16802

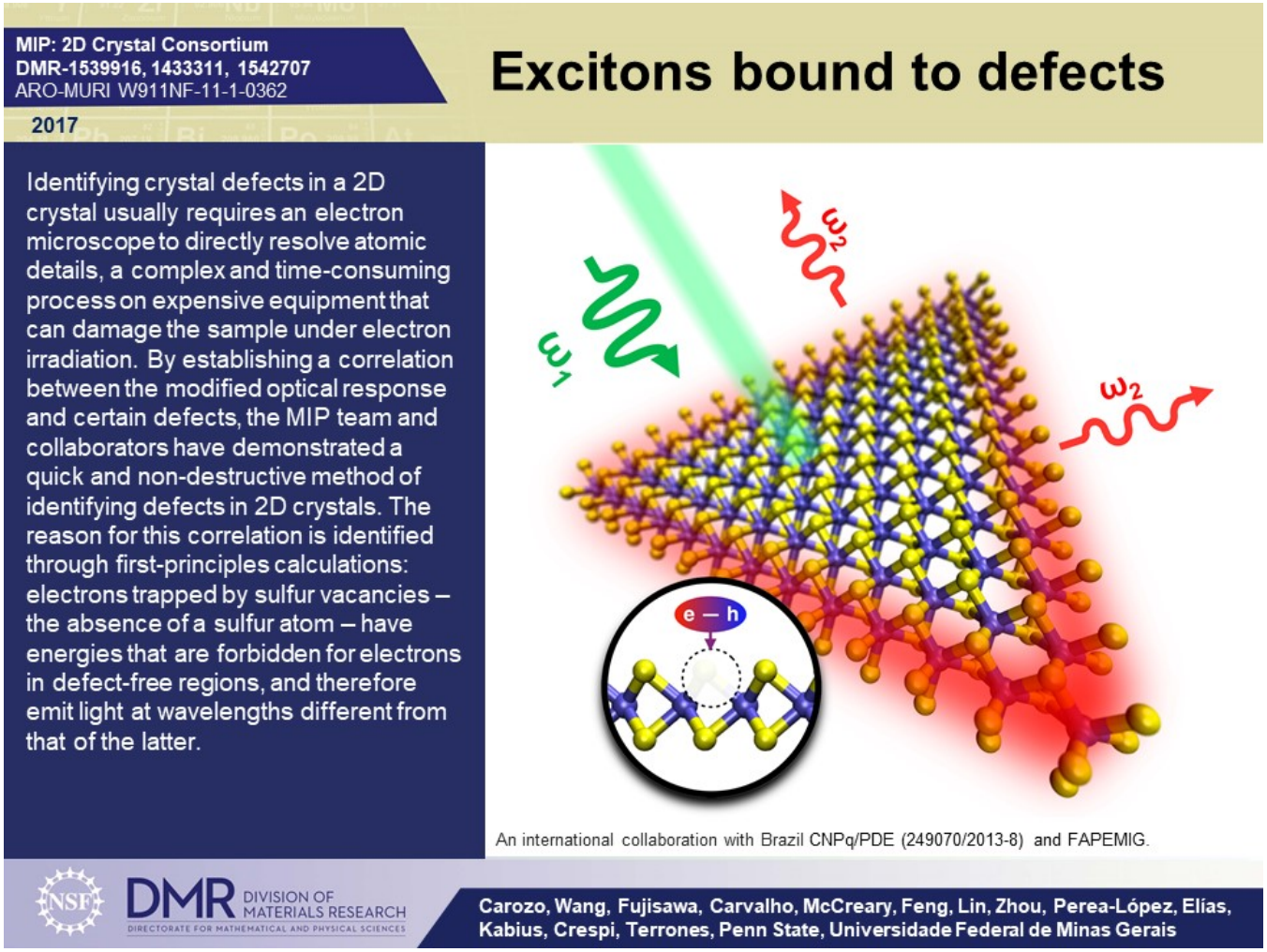


**Figure Title:** Identifying Defects.

**Figure Caption:** An atomically thin WS2 flake is shown to be excited by a laser and emit light at a different wavelength at the three edges of the triangular flake. The inset illustrates an electron-hole pair being trapped at a sulfur vacancy site.

**What Has Been Achieved:** A photoluminescence feature has been identified as excitons bound to charged sulfur vacancies in 2D WS2.

**Importance of Achievement:** The study identifies a fast, inexpensive, and non-destructive characterization method to assess the quality of 2D transition metal dichalcogenide crystals.

**Unique Features of the MIP That Enabled Project:** Close collaboration between synthesis, characterization, and theory efforts.

**Publication:** V. Carozo, Y. Wang, K. Fujisawa, B. R. Carvalho, A. McCreary, S. Feng, Z. Lin, C. Zhou, N. Perea-López, A. L. Elías, B. Kabius, V. H. Crespi, and M. Terrones, “Optical identification of sulfur vacancies: Bound excitons at the edges of monolayer tungsten disulfide”, Sci. Adv. 3, e1602813 (2017).

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