Giant optical anisotropy in natural van der Waals materials for next-generation photonics

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Abstract

Despite tremendous scientific efforts, it has not been widely appreciated that bulk counterparts to 2D materials are already van der Waals heterostructures with the intriguing physics [1]. In that regard, 3D transition metal dichalcogenides (TMDCs) are of particular importance owing to the success of its monolayers in optoelectronic devices in the visible and near-infrared spectral interval [2]. Advances in far- and near-field characterization technologies allow us to identify an unprecedented birefringence in TMDCs shown in Figure 1 [3]. This anisotropy paves the way for the next-generation photonics such as an extreme skin depth engineering [4] in the integrated scheme thanks to the generalized Snell law.

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Figures

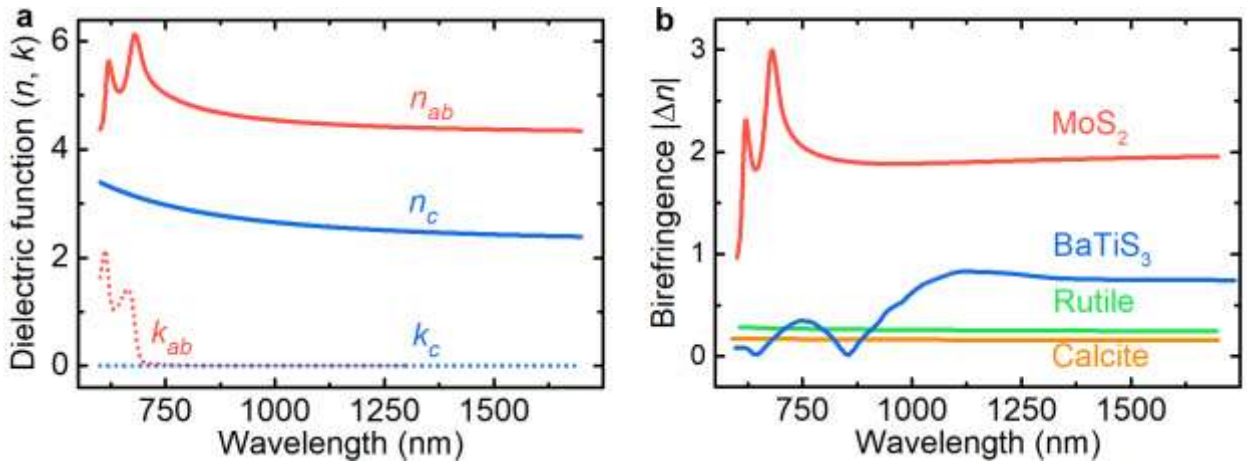

Figure 1: a. Optical constants of MoS2. **b.** Birefringence of MoS_2 in comparison with other anisotropic materials.