# Optical activity in semiconductor nanostructures : Geometric approach

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In this work we develop a theory of optical properties of topologically distorted semiconductor nanocrystals. Our work is guided by the Katanaev's geometric theory of defects [1] and the principles of transformation optics [2]. The topological distortion is represented using a nontrivial metrics, which can describe defects and strains that can exist in semiconductor nanocrystals.

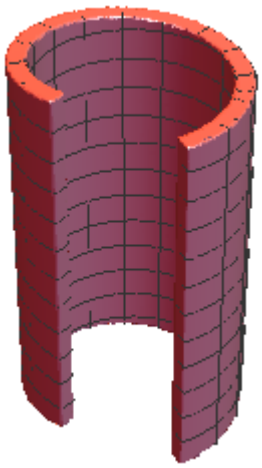

**Fig. 1** Nanoscroll with a screw dislocation.

By representing distortion of the crystal lattice with a nontrivial metric tensor, we derived an approximate expression for the complex permittivity tensor, valid up to first order of the excitation light wave vector. The developed theory was illustrated by the example of optically active semiconductor nanocrystals with structural chirality due to the presence of screw dislocations (see Fig. 1). This all makes our theory indispensable for the design and creation of new optical materials and devices, where defects will play key role in achieving new optical functionalities.

1) M. O. Katanaev, *Phys. Usp*., **2005**, *175*, 705.
2) D.-H. Lin, *Phys. Rev. A,* **2012**, *85*, 053605.