The Mixed Lanthanum Dichalcogenide $\beta$-LaS$_{1.86(1)}$Se$_{0.14(1)}$
Synthesis, Crystal Structure, Raman Spectrum and Optical Band Gap

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The ternary lanthanum sulfide selenide $\beta$-LaS$_{1.86}$Se$_{0.14}$ was obtained by reaction of the elements in an NaCl flux. The new compound adopts the $\beta$-LnS$_2$ structure type and crystallizes in the orthorhombic space group $Pnma$ (no. 62) with lattice parameters of $a = 814.77(1)$, $b = 1638.46(1)$ and $c = 413.88(1)$ pm. Raman lines indicate the presence of mixed ($S_{1-y}Se_y$)$_2^{2-}$ dianions with $y \approx 0.14$, besides the well known $S_2^{2-}$ dianions. The band gap of $\beta$-LaS$_{1.86(1)}$Se$_{0.14(1)}$ is 2.5 eV as determined by optical spectroscopy.

Key words: Polychalcogenides, Rare Earth Metal, Crystal Structure, Raman Spectra