

**Structure-sensitive investigations on alkali disilicate glass fibers
with reference to metasilicate- and silica glass fibers**

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Glass fibers of alkali disilicate composition were prepared under defined and systematically varied pulling conditions by means of the nozzle drawing method. The structure-sensitive investigations concern the optical birefringence and the "frozen-in" apparent stress optical constant, respectively, the density changes relative to the bulk glass, and the expansion and shrinking behaviour during heating and annealing. The optical properties indicate a marked cross-linking of the chain structure. The shrinking behaviour of the fibers shows an anomaly which seems to be typical of alkali disilicate glass fibers. The detailed results give a further mosaic part to earlier investigations on silicate glass fibers between the metasilicate range and silica glass fibers along the series $x\text{SiO}_2(1-x)\text{R}_2\text{O}$. The structural alterations due to the variation of the ratio network former/network modifier will be discussed over the large range of the nearly ideal three-dimensionally connected network structure of the silica glass fibers and of the nearly ideal one-dimensionally connected chain-ring-like structure of the metasilicate glass fibers.