



# SNS COLLEGE OF TECHNOLOGY

## Autonomous



### Thermotropic crystals

Thermotropic liquid crystal materials occur as liquid crystals over a certain temperature range between the solid and liquid phases. (LCD TVs, alarm clocks, etc.)

#### **Example**

**Biphenyl nitriles are commonly used as thermotropic liquid crystals.**

Most of the thermotropic liquid crystals are composed of rod-like molecules and classified into three types, nematic, smectic and cholesteric. They are formed on heating the crystalline solid or cooling the isotropic liquid.

**Nematic phase (thread-like)** is the simplest liquid crystalline phase, where the molecules maintain long-range orientation. There exists no positional order. Liquid crystals used in electronic display are primarily of the nematic type. When viewed under a polarizing microscope the defect regions linking these domains appear as dark threads.

**Smectic phase (soap-like)** a name that was coined by Friedel from a Greek word, meaning 'grease or slime'. The smectics structure is stratified as the molecules are arranged in layers with their long axes approximately normal to the plane of the layers with a well-defined interlayer spacing.

**Cholesteric phase** is also known as chiral nematic liquid crystal. The arrangement of cholesteric phase can be described as a combination of the nematic and smectic, where some layers which resemble the smectic phase are incorporated in the nematic layers. Due to the helical structure, it exhibits an interesting phenomenon like optical rotation, selective reflection and two-colour circular polarization.



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