Supporting Information

Texture analysis

The textures and texture changes under an polarizing microscope exhibited by tactoids differ considerably.

Axial and bipolar particles show Maltese cross-like patterns when viewed from the top; when viewed from the side they show a texture change from a cross-like pattern into a baseball-shaped pattern and further into an elongated shape and back again.

For bipolar particles (fig. S1) and for axial particles (fig. S2) the texture evolution is directly opposite for equal director rotation angles. But since the director cannot be determined, 0° and 90° angles cannot be told apart (in both cases: maltese cross-like patterns). Since the texture evolution for 90+° angles equals 0+° angles of the other configuration, pure texture change cannot characterize the configuration completely.

A similar case is the differentiation of radial and concentric particles. While a radial particle will show a maltese cross-like pattern from all angles (compare fig. S3), concentric will do so only under a view from a „top“ angle. Depending on the angle the center of the cross pattern will be shifted. If a concentric particle is viewed perfectly rom the side, it will be either completely colored or completely extinct (fig. S4).

Texture analysis with wave retardation plate

The wave retardation plate now colors the textures which look the same differently in all areas.

A picture of the setup is given in fig. S5. The coloration ist he same as expected in the microscopic image. With this, concentric and radial configurations can be differentiated.

Also, the same textures in axial and bipolar particles can be diferentiated using the different orientation of the mesogens in the corresponding texture areas. The expected behavior is pictured in fig. S6

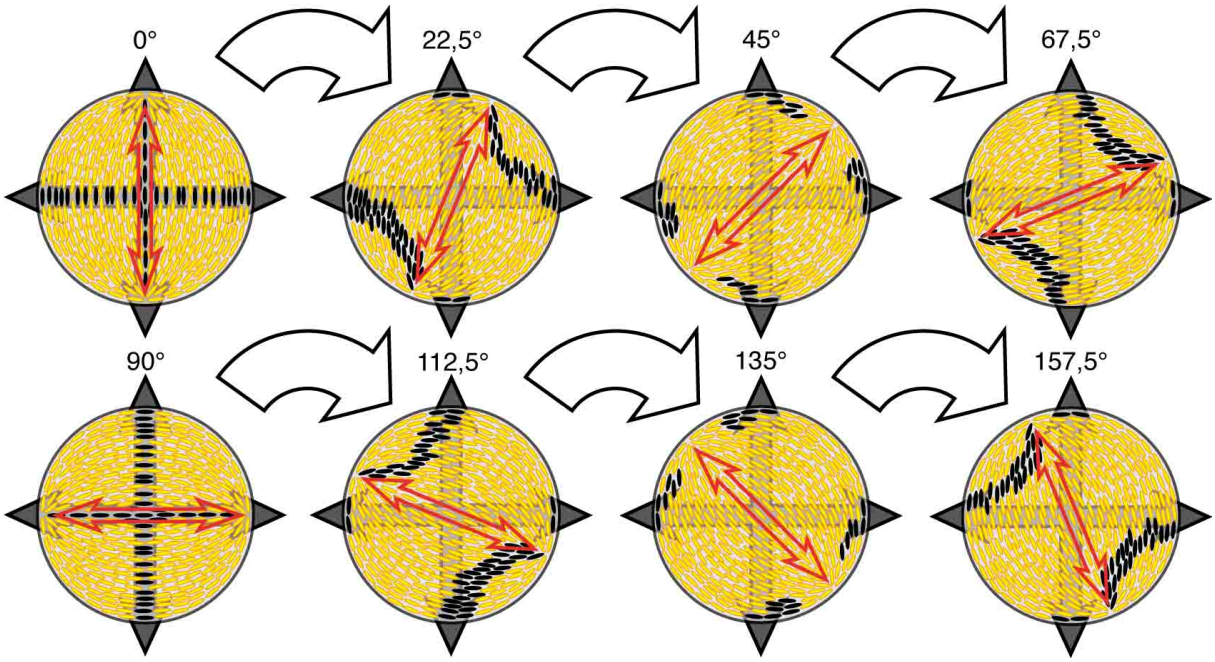

Fig. S1: Rotation Series of bipolar particles. Note the different direction of texture evolution from a cross-like pattern while the director is at 0° or at 90°. All mesogens standing parallel or perpendicular to the polarizer/analyzer setup (black arrows) are blackened

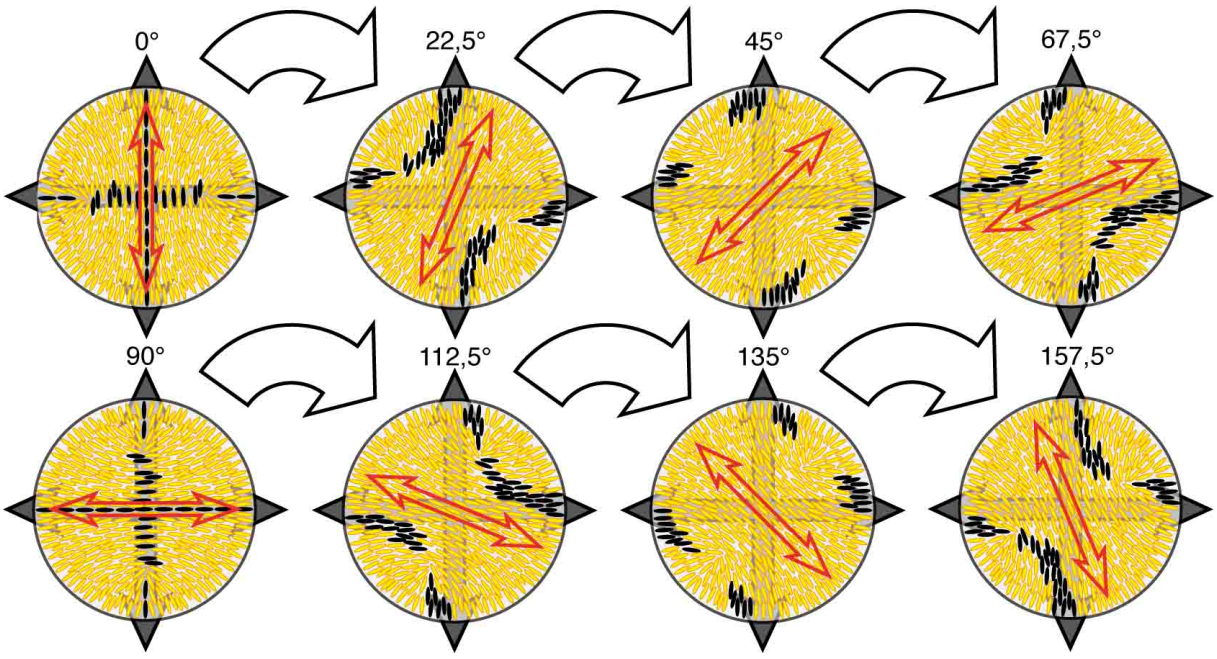

Fig. S2: Rotation Series of axial particles. Note the different direction of texture evolution from a cross-like pattern while the director is at 0° or at 90°, 0+° equals 90°+ for bipolar particles; 0+° equals 90+° for bipolar particles.

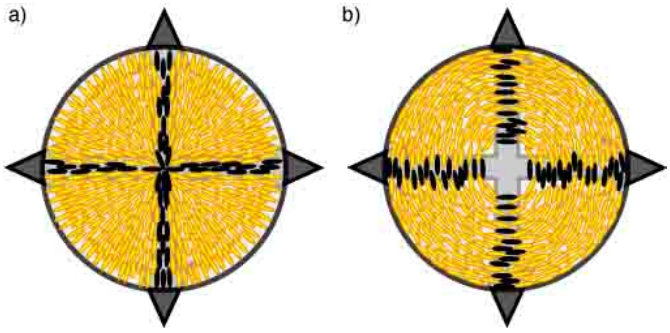

Fig. S3: Cross-like patterns in radial (a) and concentric (b) configurations. If a concentric particle is viewed from a tiltet top angle, the center if the cross will be shifted.

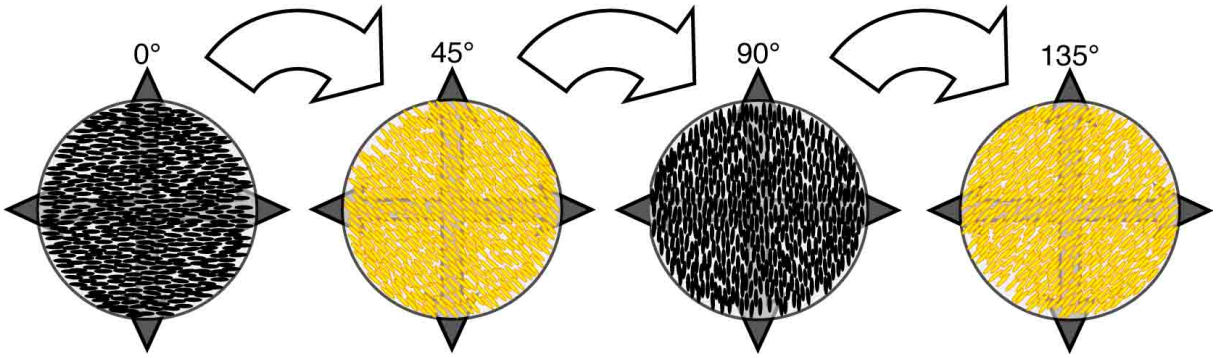

Fig. S4: Concentric particles viewed from the side under different rotational angles.

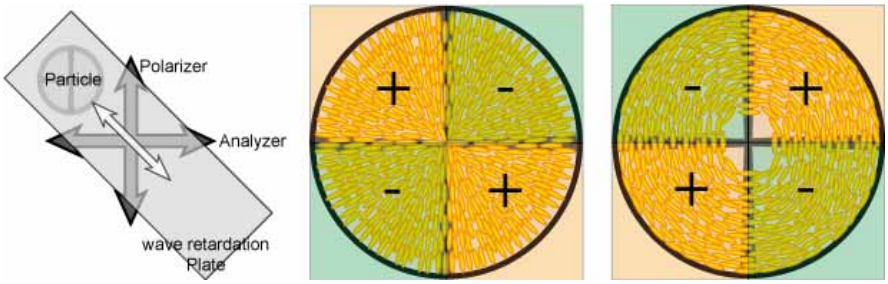

Fig. S5: Setup and expected coloring for radial (center) and concentric (right) particles

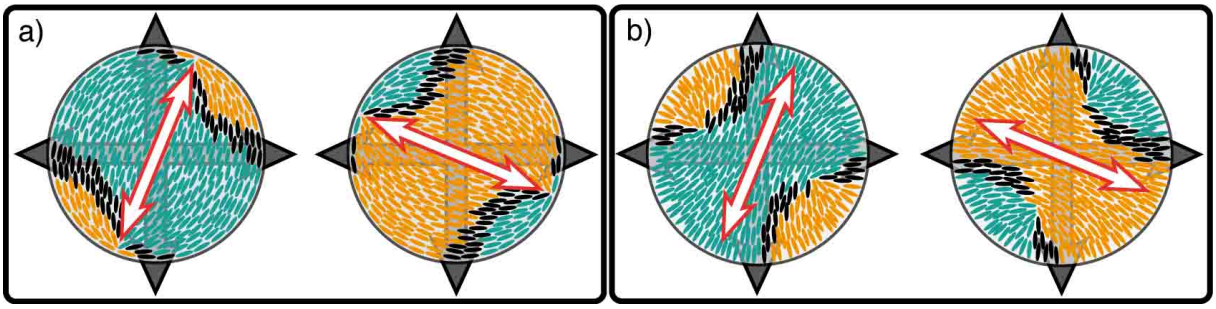

Fig. S6: Expected coloring of baseball-type textures in radial (a) and axial particles (b)