Chirality plays a fundamental role in the nature and in general in living matter. It is usually said that a human being is chiral or that we live in (a)symmetric world. An asymmetry itself is achievable by a specific substitution of chemically different groups is extremely important for the interaction observed in the living matter. A very subtle difference between two molecules showing solely a difference in a spatial arrangement of substituents with kept the quality of observed connections set leads to fundamentally different behaviour e.g., one stereoisomer (enantiomer) of the same compound will be recorded by our senses as an orange flavour, while the second will bring a smell of lemon to our nose. Because of those fundamental differences the chirality it is usually treated as a source of variety of organic compounds in the living matter and consequently allows a precise control of many biochemical processes occurring in living matter which always must be performed with an accuracy and precision because of dissimilar behaviour of two different stereoisomers what leads in some cases to poisonous properties with the second having a positive influence of the second. The chirality has got also a substantial consequence observed in macroscopic world including a day-by-day life e.g., left- or right screwing represent a pair of stereoisomers (enantiomers) which are not differing in the used material or the approach for its obtaining and the only difference is the direction of twisting which must be done with a screwdriver. The outcome of such experiment is the same (the fully used screw) which is slightly different on the molecular level where those effects and an influence of the opposite configuration has consequences observable also in interaction with polarized light where the chiroptical activity leads to observation of light absorbance at the same wavelength (the same energies) but with opposite phases because of different twisting. Actually, the chirality itself or a bit broadly defined asymmetry of the two spatial arrangements is not limited to centres of asymmetry and the chirality can be observed also for three dimensional skeletons build of saturated and unsaturated (e.g. aromatic) where the interaction with light can be shifted towards longer wavelengths from the blue region to the red zone. Thus, a precise connection in one planned skeletons of unsaturated subunits opens a path for modulation of conjugation that will interact with the light in a specific region in addition controllable with fundamental initiators.

The presented proposal focuses on the optimisation of synthetic paths for formation of three-dimensional chiral systems containing in the designed skeleton two loops imprinting helicity but also a rigid motif of axially chiral linked fluorophores. A three-dimensional organisation of applied subunits provides an access to formation of a pair of enantiomers which are treated as an image and a mirror image a similarly to human’s hands where left one is a mirror image of the right one. Such formation of target systems opens a possibility for a precise modification of the final systems with electron While focusing on formation of those systems it will be necessary to obtain precisely designed chiral motifs that will be further modified by attaching specific substituents disturbing the π-conjugation but also ready for binding dopants that will influence optical response both in regular but also in polarized conditions. This response will be further modified by enhancing the conjugation with a post-synthetic changes based on fundamental activators eventually leading to changeable response dependent on the stage of molecule.

Thus, a precise designing of enantiomerically stable derivatives with potential further derivatisation gives eventually a 3D twisted systems in addition doped with specific set of cations with introduced chirality into strongly conjugated and switchable pi-extended motif that will potentially find an application in day-by-day life creating an alternative for currently available absorbing/emitting materials.