During the 2nd stage of the FOTOPOL project we achieved the photoprocessing of new Ca and Zn (not with Pb) stabilized T56 vinyl polychloride compositions and the biological testing of the irradiated materials. To this end, several experimental setups were built, specific to each type of photoprocessing. In a first set if experiments we used direct irradiation, in air, of T56 vinyl polychloride sheets. The irradiations were made at two wavelengths, one in ultraviolet (266 nm) and one in infrared (1060 nm). The laser/pulse fluence was varied, as well as the number of successive laser pulses sent to the same location. In order to achieve three dimensional structures, first we deposited vinyl polychloride thin films using the matrix assisted pulse laser evaporation technique (MAPLE). To this end, the vinyl polychloride granules were dissolved (2-3 mass percentages) in solvents such as methylethylketone, tetrahydrofuran, cyclohexanone, as well as a mixture of the three solvents. The obtained mixture was frozen in a copper target holder, specially designed for such experiments, and inserted into the deposition chamber. In order to maintain the target frozen during the deposition, a flowing liquid nitrogen circuit was realized. The targets obtained as described above were irradiated in vacuum, at a pressure of 10^{-5} mbar with a laser working at 266 nm. The material resulted from the laser ablation of the frozen mixture (*i. e.* the polymer, as the vaporized solvent was evacuated through the pumping system) was collected on silicon, quartz, and triazine covered quartz substrates. Triazine is a biocompatible polymer exhibiting a high absorption coefficient at the laser wavelength that was used. The obtained vinyl polychloride thin films obtained in this manner were characterized by atomic force microscopy (AFM) and Fourier transform infrared spectroscopy (FTIR). The PVC/triazine/quartz and PVC/quartz structures were used subsequently as targets for the deposition of three dimensional structures by laser induced forward transfer (LIFT). The experiments were conducted in air by irradiating the undeposited side of the respective structure; the transferred material was then deposited on glass and silicon substrates.

Biocompatibility tests of the obtained structures were realized by cultivating human HeLa epithelial eukariotic cells for 72 hours in complete RPMI media. In order to determine the adherence of human cells on the vinyl polychloride support, the intracellular localization of the actin filaments was tested, and in order to determine whether the adhered cells can proliferate these were marked with anti-Ki67 antibodies, a nuclear marker which expresses itself only in cells in the G1, S, G2, and M phases of the cellular cycle, and not in those in the interphase (G0). The morphology of the cells was evidenced using an inversion microscope.

It was noted that the irradiation of vinyl polychloride tablets leads to the improvement of their biocompatibility. Moreover, it should be noted that the vinyl polychloride tablets irradiated at 266 nm and smaller energy (4.5 mJ) exhibit better biocompatibility qualities with human HeLa than those exposed to 1064 nm radiation wavelength and higher laser energies.