As SiCf/SiC composites are very low activation materials, their use as structural material for the reactor blanket and first wall components appears essential to demonstrate the potential of D-T fusion power reactor. Positive features of SiCf/SiC are their high performances at elevated operating temperature and the ability to produce a specific component. Critical issues of SiCf/SiC are the mechanical properties, radiation stability and, with regard to technological issues, their hermeticity and joining processes. Improvement of joining processes for SiCf/SiC components is also needed.

Recently, several blanket designs have been studied: the TAURO blanket concept in the European Union, the ARIES-AT concept in the US and the DREAM concept in Japan. In those reactors, hermetic SiCf/SiC or self-sealing coatings are mandatory. The basic idea of self sealing concept is to manufacture a coating with specific requirements (CTE and wettability suitable for SiCf/SiC, low neutron activation, neutron irradiation stability and thermo-mechanical stability, stability with coolant) that can be self sealed: cracks formed in the coating could be repaired heating the component. The self-sealing concept can be combined with a specific design of a mechanical joint, in order to obtain mechanical and sealant joints for SiCf/SiC.

The choice of the self-sealant joining and coating material is the aim of this work: the available elements will selected also according to their environmental characteristics, and in particular to their neutron-induced radioactivity. Irradiation will be simulated by means of the EASY code package, and contact dose rates will be evaluated: the main goal is the possibility to allow hands-on recycling of the component after an adequate cooling period. A final short-list of constituting elements that comply with the requirements will be compiled and discussed.

Preparation of joined specimens and mechanical tests on joined SiC/SiC will be done, accordingly to the wettability results; the most promising samples will be submitted to neutron irradiation.