Ferromagnetic nanocrystals inside a semi-conducting matrix [1] are aimed to the development of new devices in the field of spintronics e.g. data information storage and high sensitive magnetic sensors [2]. It was already shown through dose ion implantations [Ge, Sm, Co, Mn, As] into SiC or Si followed by rapid thermal annealing lead to the formation of embedded nanocrystals [3,4]. In the case of Co-implantation it was shown that rapid thermal annealing lead to the formation of embedded nanocrystals [Ge, Sm, Co, Mn, As] into SiC or Si followed by annealing at temperatures up to 1000°C. Cross-section TEM samples have been prepared using the following methods and techniques:

Sandwiches were glued together using ceramic based glue instead of common epoxy (for high temperature treatment) and were put into special Ti-plates. The thin TEM sample was made by using mechanical grinding, dimpling and polishing, followed by low angle Ar-ion etching. Plasma cleaning of the final sample has been used to remove any residual hydro carbon from the sample surface to avoid contamination during heating.

In-situ TEM investigations were carried out using a Philips CM20 microscope together with a Gatan heating stage sample holder (specified to 1000°C). HRTEM, EFTEM and STEM-tomography investigations were carried out using a Cs-corrected FEI Titan 80-300 operating at close to 300kV.

In the top-right corner an enlargement of the boxed area is shown, demonstrating the filling of the voids with nanocrystals.