

# Reducing Electron Beam Induced Radiation Damage on SKBR3 Cells by Graphene Coating

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Epidermal Growth factor receptor 2 (HER2) is overexpressed in 20% of all breast cancer cases [1]. It is target by anti-cancer drugs like Trastuzumab but drug resistance remains a major clinical problem [2]. Finding insights into the mechanism of Trastuzumab is assumed to be essential for improvements in cancer treatment. Single cell- and single molecule analysis of HER2 can be performed using correlative fluorescence microscopy and scanning transmission electron microscopy (STEM). For electron microscopy, a high vacuum is required. The drawbacks of imaging biological samples under high vacuum conditions are first the evaporation of water from the sample, and second the collapse of cell material like the cell membrane. We therefore enclose cells in hydrated state in a graphene liquid cell [3]. For stability, the cells are chemically fixed after labeling HER2 with a biotinylated affibody molecule and streptavidin Quantum Dots 655. An important question is how stable these samples are to radiation damage occurring during electron microscopy. Image series were acquired in STEM to evaluate the sample stability to electron beam irradiation at an accumulated dose.

[1] P R Pohlmann, I A Mayer and R Mernaugh, *Clinical Cancer Res.* **15** (2009) p. 7479.

[2] T Vu and F X Claret, *Frontiers Oncol.* **2** (2012) p. 62.

[3] I N Dahmke, *et al.*, *ACS Nano* **11** (2017) p. 11108.