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**Silica-gold nanoshells as potential intraoperative molecular probes for HER2-overexpression in ex vivo breast tissue using near-infrared reflectance confocal microscopy.**

*Bickford LR, Agollah G, Drezek R, Yu TK.; Breast Cancer Res Treat. 2010 Apr;120(3):547-55. Epub 2009 May 6. DOI: 10.1007/s10549-009-0408-z*

### **ABSTRACT**

Obtaining negative margins is critical for breast cancer patients undergoing conservation therapy in order to reduce the reemergence of the original cancer. Currently, breast cancer tumor margins are examined in a pathology lab either while the patient is anesthetized or after the surgical procedure has been terminated. These current methods often result in cancer cells present at the surgical resection margin due to inadequate margin assessment at the point of care. Due to such limitations evident in current diagnoses, tools for increasing the accuracy and speed of tumor margin detection directly in the operating room are still needed. We are exploring the potential of using a nano-biophotonics system to facilitate intraoperative tumor margin assessment ex vivo at the cellular level. By combining bioconjugated silica-based gold nanoshells, which scatter light in the near-infrared, with a portable FDA-approved reflectance confocal microscope, we first validate the use of gold nanoshells as effective reflectance-based imaging probes by evaluating the contrast enhancement of three different HER2-overexpressing cell lines. Additionally, we demonstrate the ability to detect HER2-overexpressing cells in human tissue sections within 5 min of incubation time. This work supports the use of targeted silica-based gold nanoshells as potential real-time molecular probes for HER2-overexpression in human tissue.