Development of HPMC Based Composite Wafers for Buccal Delivery of Nicotine
O. Okeke, J. Boateng
University of Greenwich

**Purpose**
HPMC is a hydrophilic polymer, widely used in pharmaceutical dosage forms including mucoadhesive formulations. Wafers have been recognised as appropriate dosage forms for buccal drug delivery. Wafers development by the freeze-drying process involves low temperatures and could be useful in stabilising nicotine by limiting evaporation. The purpose of the research was to develop an optimised and stable buccal formulation in the form of freeze-dried wafers, using HPMC modified with sodium alginate as potential delivery system for nicotine replacement therapy.

**Methods**
Gels (2% w/v) containing different ratios (2:0, 7:1, 3:1 and 5:3) of HPMC and sodium alginate (SA) respectively, were prepared under ambient conditions by dissolving the polymers in deionised water and loaded with nicotine (NCT) at concentration of 2%. Wafers were obtained by freeze drying the gels using a Virtis Advantage XL 70 freeze dryer with an automated freeze drying cycle. The formulations were characterised for mechanical ‘hardness’ (texture analyser), morphology (SEM), drug loading efficiency (HPLC) and in vitro drug dissolution (HPLC).

**Results**
Figure 1(a) shows the mechanical properties of blank (BK) and drug loaded (DL) wafer formulations with no significant difference in hardness. SEM [Figure 1(b)] demonstrated sponge-like pores in the internal morphology of the composite wafer formulations. High NCT content above 90% was retained within the composite wafers [Figure 1(c)] without the need for a stabiliser as is been previously reported for buccal films. In vitro drug release was improved [Figure 1(d)] for composite wafer formulations compared to single polymer wafers.

**Conclusion**
The wafers which were porous due to the freeze-drying process showed ability to maintain a high NCT loading efficiency. The wafers with the highest concentration of SA showed the best release profiles, confirming the modifying effect of SA in optimising the functional properties of HPMC based wafers. Therefore, composite HPMC wafers optimised with SA, show potential as buccal drug delivery systems for NCT replacement therapy.