Distribution Analysis of Components in the EVRA® Patch by Confocal Raman Microscopy

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Introduction
Confocal Raman microscopy (CRM) mapping is a powerful tool for distribution analysis of components within complex matrices. CRM combines the submicron spatial resolution of confocal microscopy with the nondestructive content analysis capabilities of Raman spectroscopy. CRM maps are generated by raster scanning the sample through a focused laser beam and collecting a spectrum at each position. The CRM data is then reconstructed to form an image composed of hundreds to thousands of pixels, each containing a full Raman spectrum. CRM images were generated at different locations within EVRA® samples to characterize drug product and excipient distribution within the adhesive matrix. A set of formulation standards was prepared and analyzed to facilitate PLS modeling. Component distribution analysis was performed on EVRA® patches as a function of time from manufacture through product expiry and a partial least squares (PLS) model was developed to determine if any change in drug concentration relative to PVP concentration occurred.

Background/Experimental
Active region is composed of nonionic gum (NGMN), ethylcellulose (EC), polyisobutylene/polyisoprene (PIB/PB), crosslinked (CL), and nonwoven fibers composed of polyethylene terephthalate (PET)

Sample Location
PIB/PB (73.75 wt%, 20.15 mg), PVP (50 wt%, 50 mg), PET (4 wt%, 12 mg)

Background spectra of all components found in active region

CRM Imaging of EVRA® Patches
-Spectra characteristic of PET, PIB/PB, PVP, and NGMN extracted from CRM image of EVRA® sample

PLS of EVRA® CRM Images
-PLS image showing predicted NGMN wt%/(NGMN wt%+PVP wt%)

Conclusion
Distribution analysis was performed on all components in the active region of the EVRA® patch
NGMN and EE are strongly associated with PVP aggregates dispersed throughout the adhesive matrix with no NGMN or EE detected in the PIB/PB matrix.
LL associates with both the aggregate and matrix regions within patch
NGMN concentration does not change significantly with respect to PVP concentration from time of manufacture

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