Measuring Residual Stresses in Monolithic Fuel Foils using Neutron Diffraction
B. Clausen¹, D. W. Brown¹*, M. A. Okuniewski², L. Balogh¹, T. A. Sisneros¹
¹Los Alamos National Laboratory, Los Alamos, New Mexico, 87545
²Idaho National Laboratory, Idaho Falls, Idaho 83415
*Corresponding author

Abstract (Residual Stress Session)
Residual stresses are expected in monolithic, aluminum clad uranium 10 weight percent molybdenum (U-10Mo) nuclear fuel plates because of the large mismatch in thermal expansion between the dissimilar bonded materials. Measurements of thin foil samples using neutron diffraction is not straightforward due to partially filled gauge volumes which can give rise to significant geometrical pseudo-strains if not addressed properly. In the present case we used annealed copper foils attached to both sides of the fuel foils as an ‘on-board’ calibrant. By using multiple sequential measurements of the same strain components in both banks of the SMARTS instrument it was possible to validate the approach and determine an effective error bar for the technique. Residual stresses were then determined in several “mini-plates” with different processing routes and in a full sized fuel plate. The results will be presented.