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SANS and Contrast Variation Measurement of the Different Contributions to the Total Surface Area in PBX 9501 as a Function of Pressing Intensity JOSEPH MANG, REX HJELM, Los Alamos National Laboratory — We have used small-angle neutron scattering (SANS) with the method of contrast variation to measure the surface area (S_{HB} , S_{HV} and S_{BV}) associated with the three interfaces (HMX-binder(HB), HMX-voids(HV) and binder-voids(BV)) in pressed pellets of PBX 9501. These interfaces are of interest as they may influence the transmission of microstresses under shock conditions. Because of the difficulty in making measurements, little is known about the microstructure of pressed PBX 9501 parts and thus how it is affected by processing. Here, we explore the effect of varying the pressing intensity on the PBX 9501 microstructure and in particular how the three interfaces are affected. Disk-shaped samples of PBX 9501 were die-pressed with applied pressures ranging between 5,000 - 29,000 psi. SANS measurements were performed, on the LOW-Q Diffractometer at the Manuel Lujan Jr. Neutron Scattering Center, on 4 - 5 pellets at each pressure. Analysis of the SANS data indicates systematic changes in S_{HB} , S_{HV} and S_{BV} with applied pressure. Our ability to measure the different contributions to the total surface area is novel for this system and future measurements will aid in the development of full-scale constitutive models for both pristine and damaged high explosive materials.

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