PS/HDPE

Typical results. We have studied modulus behavior in this system extensively.

Our first impact study. Not what we were hoping to see!
PS/PP

Phase inversion point

Approximate region of greatest synergy

Error Bar = ± 18.9

Tensile Modulus (MPa)

Impact Resistance (J/m)

Better. Quite different compared to HDPE blend.
Domain Size Comparison

Dispersed phase region: 20% PS content, comparing HDPE and PP matrix blends.
Summary and Conclusions

**PS/HDPE**

- Tensile modulus is near the proportional value
- Impact resistance shows disappointingly poor behavior, i.e. phases are highly incompatible
  - Morphology appears too coarse
    - Toughening mechanisms of slippage and localized plastic deformation not effective
    - Limited degree of crack deflection
PS/PP -- Stiffness

- Tensile modulus is also approximately proportional
  - Slightly higher on PP-rich side of phase inversion
  - Slightly lower on PS-rich side of phase inversion
  - 20% PS addition to PP increases modulus 38% over neat PP
Summary and Conclusions

PS/PP -- Toughness

- Impact strength of the blends is above the rule of mixture throughout the composition range
  - The maximum improvement is found at 15-20% PS
  - 127% improvement over the 20% PS rule of mixture value
  - 94% improvement, at 20% PS, over the impact resistance of neat PP
- Combined effect is to improve stiffness and impact properties of PP

Bottom Line:
Small additions of PS to PP produce:

- Young’s Modulus ↑
- Impact Resistance ↑