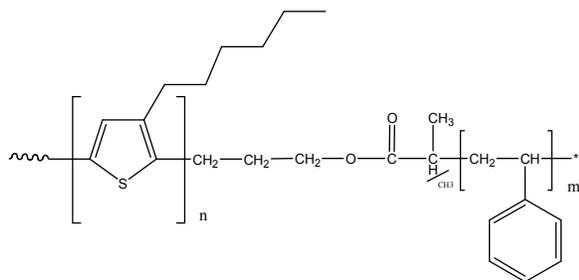


Sample Name:
Poly(3-hexyl thiophene-b-styrene) or Poly
(Styrene-b-3-hexyl thiophene)

Sample #: P13162-3HTS

Structure:



Composition:

Mn x 10 ³ (3HT-b-S)	PDI	Regioregularity of P3HT
15.0-b-45.0	1.8	~90% (H-T)

Synthesis Procedure:

1. Hydroxy terminated poly(3-hexylthiophene):

Hydroxy terminated poly(3-hexylthiophene) was prepared using Ni based catalyst and reaction terminated by allyl-MgBr followed by opening of double bond to OH. The triminal oh group was converted to bromo isobuteryl group for the control radical process for the styrene polymerization.

2. Block copolymer:

Styrene was polymerized by ATRP with bromide terminated poly(3-hexylthiophene) as initiator.

3. Purification of polymer:

The crude polymer was recovered from reprecipitation into methanol. The inorganic salts were removed by using a Soxhlet extractor with Methanol.

Finally the crude polymer was dissolved in Toluene/CHCl₃ (5:5 v/v) ratio and the product was filtered through a column packed with silica to remove the unreacted poly hexyl thiophene and the any other inorganic impurities. The product was precipitated in large excess of acetone (hot) to remove any homopolystyrene fractions that might occur in control radical process. The pure polymer was obtained.

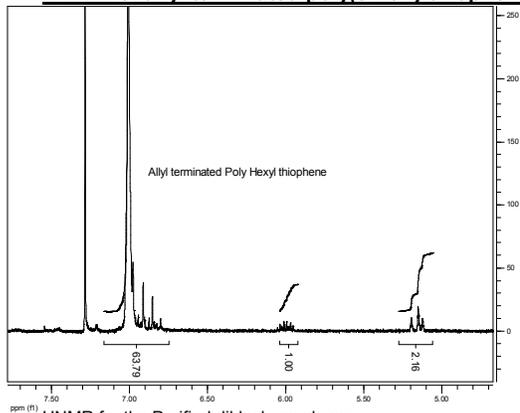
Characterization:

The molecular weight and polydispersity index (PDI) are obtained by size exclusion chromatography (SEC) in THF or Chloroform. SEC analysis was performed on a Varian liquid chromatograph equipped with refractive and UV light scattering detectors. Three SEC columns from Supelco (G6000-4000-2000 HXL) were used with triple detectors from Viscotek Co. The molecular weight is calculated based on polystyrene standards. The NMR spectrum was recorded in deuterated chloroform to determine the functionality and the composition of copolymer.

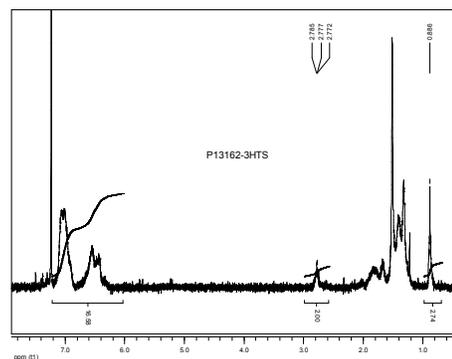
Solubility:

Poly(3-hexyl thiophene-b-styrene) is soluble in THF, Toluene and CHCl₃. It precipitates from methanol and acetone.

H NMR of allyl terminated poly(3-hexylthiophene):

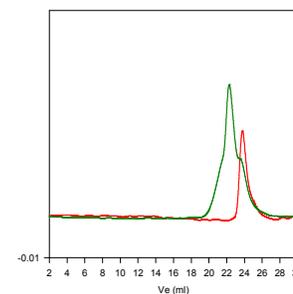


HNMR for the Purified diblock copolymer:



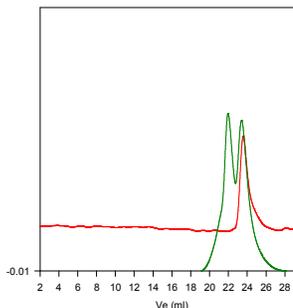
SEC profile of polymers:

P13162-3HTS



Size exclusion chromatography of poly(3-hexylthiophene-b-styrene):
 — Allyl terminated poly(3-hexylthiophene), M_n=15,000, M_w=17200, M_w/M_n=1.15
 — Block Copolymer M_n=P3HT(15000)-b-PS(45,000), M_w/M_n=1.8

P13162-3HTS (UV detection)



Size exclusion chromatography of poly(3-hexylthiophene-b-styrene) under UV detection at 380 nm:
 — Allyl terminated poly(3-hexylthiophene), M_n=15,000, M_w=17200, M_w/M_n=1.15
 — Block Copolymer M_n=P3HT(15000)-b-PS(45,000), M_w/M_n=1.8