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13. ABSTRACT (Maximum 200 words)
This research has produced a new polymer synthesis technique for generating well defined segmented thermoplastic elastomers. Chain propagation using ring opening chemistry has been coupled with step propagation techniques to create solvent resistant segmented elastomers, wherein each segment possesses a narrow molecular weight distribution.
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Model telechelomers of these segmented copolymers were synthesized, fully characterized, then examined by differential scanning calorimetry to quantify micro-phase separation. This information led to the first quantitative data ever presented regarding segment lengths needed for perfect phase separation.

Based on these model studies, segmented copolymers were synthesized by first creating these well defined telechelomers, followed by step polymerization using alanine as a mediator for this chemistry. This was the first report ever using alanine in this regard.

Further, another class of solvent resistant elastomers was made using siloxane copolymers as the initiator for graft ring opening polymerization. These elastomers have the greatest potential of all the polymers made thus far.

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CHAIN PROPAGATION/STEP PROPAGATION POLYMERIZATION.
REGULAR THERMOPLASTIC ELASTOMERS

FINAL REPORT

K. B. Wagener

1/15/91

Contract #DAAL03-86-K-0050

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SUMMARY AND CONCLUSIONS:

This research has produced a new polymer synthesis technique for generating well defined segmented thermoplastic elastomers. Chain propagation using ring opening chemistry has been coupled with step propagation techniques to create solvent resistant segmented elastomers, wherein each segment possesses a narrow molecular weight distribution.

Model telechelomers of these segmented copolymers were synthesized, fully characterized, then examined by differential scanning calorimetry to quantify micro-phase separation. This information led to the first quantitative data ever presented regarding segment lengths needed for perfect phase separation.

Based on these model studies, segmented copolymers were synthesized by first creating these well defined telechelomers, followed by step polymerization using alanine as a mediator for this chemistry. This was the first report ever using alanine in this regard.

Further, another class of solvent resistant elastomers was made using siloxane copolymers as the initiator for graft ring opening polymerization. These elastomers have the greatest potential of all the polymers made thus far.

The research continues with a new contract. Included in this new investigation are studies of these polymers as barriers to gas diffusion. Chemical protection is the application in mind.