PHYSICAL MODIFICATION OF NYLONS BY STRESS-AGING AND BLENDING

by

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To my mother
Mrs.Sneh Sakhuja

CERTIFICATE

This is to certify that the thesis entitled "PHYSICAL MODIFICATION OF NYLONS BY STRESS-AGING AND BLENDING", submitted by Mrs.Anu Verma, to the Indian Institute of Technology, Delhi for the award of Doctor of Philosophy, is a record of the bonafide research carried out by her. Mrs.Anu Verma has worked under our guidance for submission of this thesis, which to our knowledge has reached the required standard.

The thesis, or any part, thereof, has not been submitted to any other University or Institution for the award of any Degree or Diploma.

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ABSTRACT

A study was conducted on physical modification of the structure of nylons by the method of stress aging and blending. Stress aging was carried out for drawn nylon-6 under a stress of 2g/d. Drawing at 50% r.h. followed by stress aging at 30% r.h. produced marked improvement in the tensile properties. This was attributed to the formation of stable microcrystals at 30% r.h. because of the unique, non-linear Tg vs regain relationship. On the basis of experimental observations it was possible to explain the reported non-linear trend in properties of nylons with increasing regain. Blending of nylon-6 and nylon-66 was carried out by co-extrusion in the whole range of compositions with particular emphasis on small amounts of one polymer in the other. Most significant improvement in properties were achieved at these low blend compositions in which the minor component remained amorphous while severely affecting the crystallization behaviour of the major component. The nylon-6 rich blends crystallized predominantly in the γ-crystalline form while the nylon-66 rich blends exhibited low crystallinity. Due to this the blends were more easily drawable, giving rise to a more highly aligned structure with improved tensile properties and better uniformity. Particularly high tenacity and modulus were observed for blend sample containing 70% nylon-6 and 30% nylon-66.

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