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Valorization of Waste Fishing Nets:Mechanical Recycling and Characterization of Recycled/Virgin Blends

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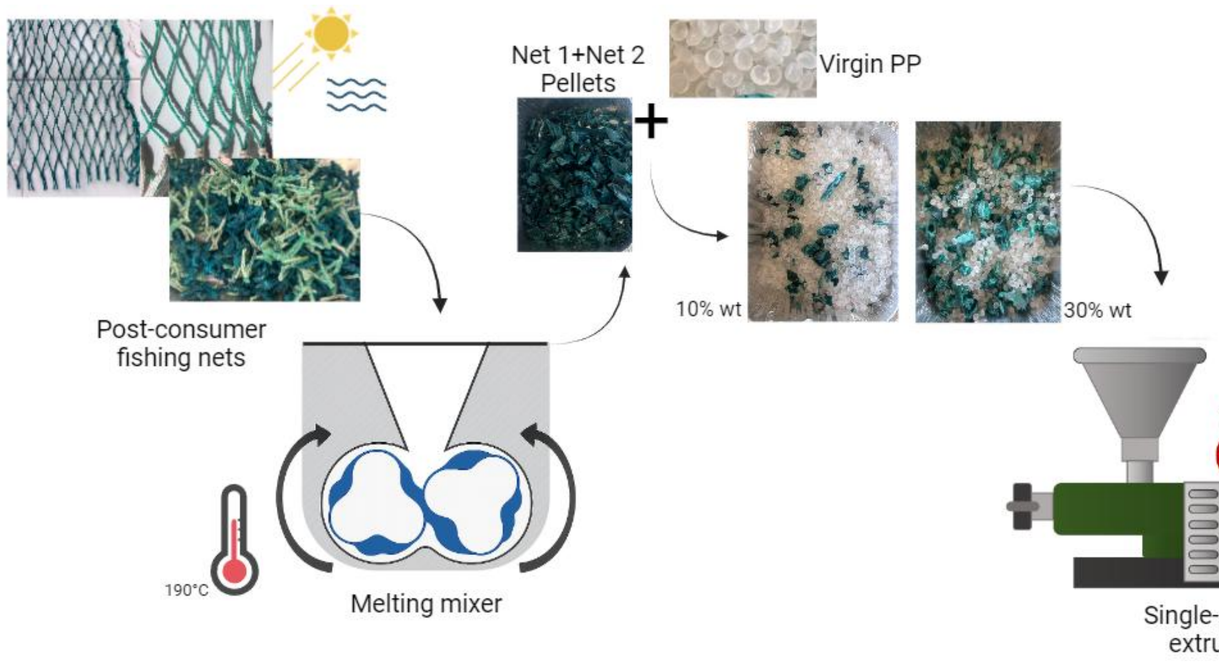
INTRODUCTION & AIM

- The fishery supply chain which includes fishing, aquaculture, processing, preservation, makes extensive use of plastic materials. Items such as fishing nets, containers, mussel nets and packaging are essential but significantly contribute to marine litter and environmental pollution.
- Discarded fishing nets are especially problematic, as they are made from oil-derived polymers and create long-lasting plastic waste in marine ecosystems.
- In this study, fishing nets made of polypropylene (PP) were collected and mechanically recycled and valorized as secondary raw materials to reduce reliance on virgin plastics and mitigating environmental impacts.

METHOD

MATERIALS AND PREPARATION



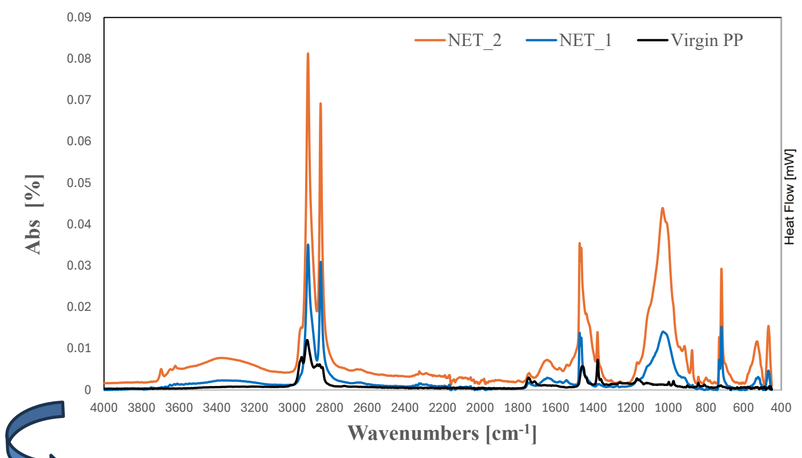
CHARACTERIZATIONS

- **Rheological Analysis:**
  - ✓ Under shear flow;
  - ✓ Under non-isothermal elongational flow;
- **Mechanical properties:**
  - ✓ Tensile properties of isotropic sheets and oriented fibers;

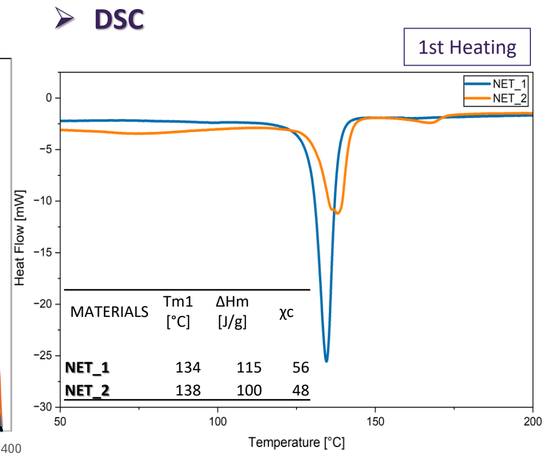
RESULTS & DISCUSSION

POST-CONSUMER FISHING NETS CHARACTERIZATIONS

- **Spectra analysis**

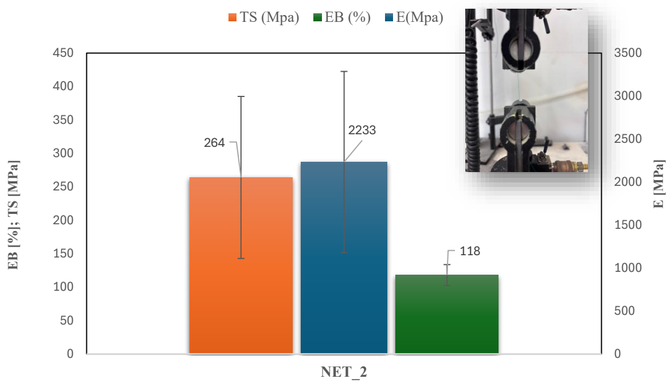


- **DSC**



- Different properties from virgin PP due to photo-oxidation during its service life.

- **Mechanical characterization: tensile properties**

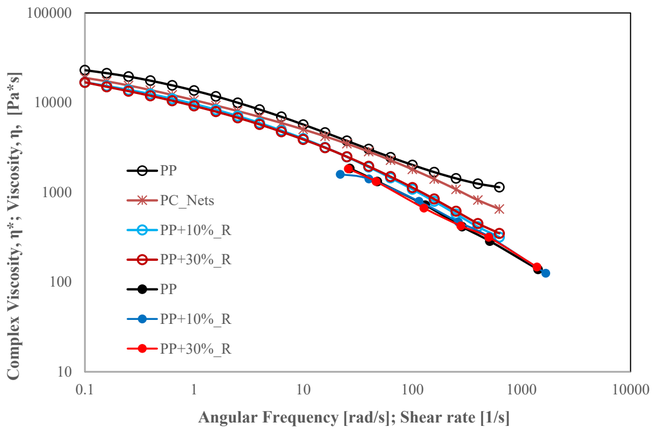


Mantia, F.P.L.; Mistretta, M.C.; Titone, V. Rheological, Mechanical and Morphological Characterization of Monopolymer Blends Made by Virgin and Photo-Oxidized Polypropylene. *Recycling* **2021**, *6*, 51. https://doi.org/10.3390/recycling6030051

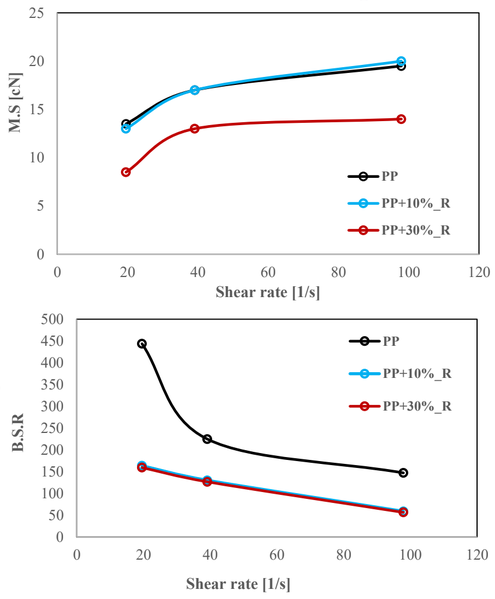
RECYCLED/VIRGIN BLENDS CHARACTERIZATIONS

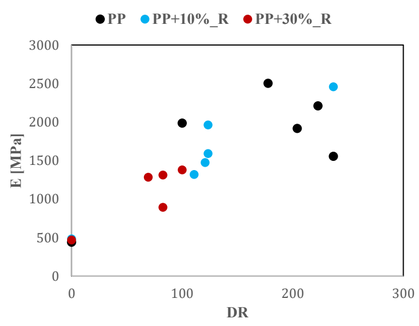
RHEOLOGICAL CHARACTERIZATION

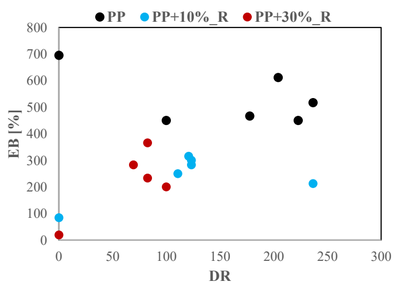
- **Under shear flow**



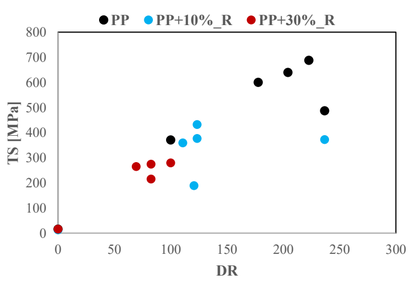
- **Under non-isothermal elongational flow**





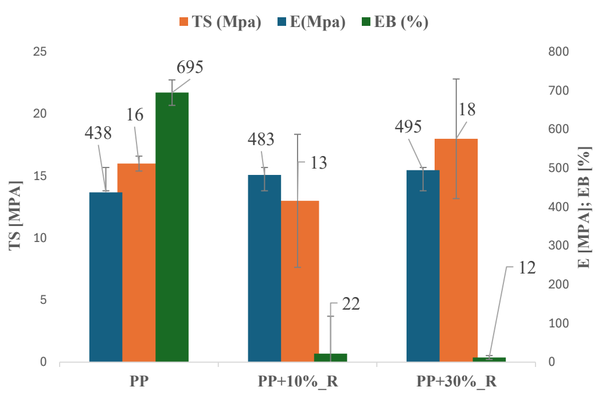


- **Tensile properties of oriented fibers as a function of the draw ratio**



MECHANICAL CHARACTERIZATION

- **Tensile properties of isotropic sheets**



Mantia, F.P.L.; Titone, V.; Milazzo, A.; Ceraulo, M.; Botta, L. Morphology, Rheological and Mechanical Properties of Isotropic and Anisotropic PP/rPET/GnP Nanocomposite Samples. *Nanomaterials* **2021**, *11*, 3058. https://doi.org/10.3390/nano11113058

CONCLUSION

- Higher recycled content → increased elastic modulus but reduced elongation at break;
- Further analyses to explore the effects of recycling and blending.