What if we add recyclable sites along the polyethylene chain and incorporate intermolecular interactions through the diol?

Polyesters are chemically recyclable due to the hydrolysis of the ester bond. Base-catalyzed ester cleavage.

What are the steps to synthesizing this product?

**Carboxy-telechelic PE synthesis**

1. Maleic acid + cyclooctene (G2 cat., THF, 40 °C) → polycyclooctene
2. Polycyclooctene + divinyl sulfone (a-hydroxyaryl, Toluene, 4.5 h) → carboxy-telechelic PE
3. Carboxy-telechelic PE + cytosine diol (TfI/PrO) → ester-linked polyethylene with H-bonding capabilities (PECy)

**Cytosine Diol Synthesis**

1. Cytosine + divinyl sulfone (NaHCO₃, DMSO, 23 °C, 1 h) → cytosine + sulfone
2. Cytosine + sulfone + diethanolamine (NaHCO₃, DMSO, 23 °C, 1 h) → cytosine diol
3. Cytosine diol + diethanolamine (TfI/PrO) → ureido cytosine diol

What are the future steps to this project?

**Modification of the diol:**

- Benefits:
  - Complimentary quadruple hydrogen bonding
  - Ensures F=2 functionality of the diol

**Utility in Selective Additive Manufacturing Applications:**

- What if we incorporated depolymerizable sites into plastics?
- Allow for predictable and clean fracture
- Usage of computational strategies (i.e. FEM) to determine most effective site placement