CLAIMS

1. A dual catalyst system for producing propylene from butene, the dual catalyst system comprising a metathesis catalyst zone and a cracking catalyst zone downstream of the metathesis catalyst zone where:

the metathesis catalyst zone comprises mesoporous silica catalyst impregnated with metal oxide, where the mesoporous silica catalyst includes a pore size distribution of at least 2.5 nm to 40 nm and a total pore volume of at least 0.600 cm^3/g; and

the cracking catalyst zone comprises a mordenite framework inverted (MFI) structured silica catalyst, where the MFI structured silica catalyst includes a pore size distribution of at least 1.5 nm to 3 nm, and a total acidity of 0.001 mmol/g to 0.1 mmol/g.

2. The dual catalyst system of claim 1 where the metathesis catalyst zone and the cracking catalyst zone are disposed in one reactor.

3. The dual catalyst system of claim 1 where the metathesis catalyst zone is disposed in a first reactor and the cracking catalyst zone is disposed in a second reactor downstream of the first reactor.

4. The dual catalyst system of claim 3 further comprising a conduit between the first reactor and the second reactor.

5. The dual catalyst system of claim 1 where the metal oxide of the mesoporous silica catalyst comprises one or more oxides of molybdenum, rhenium, tungsten, or combinations thereof.

6. The dual catalyst system of claim 1 where the mesoporous silica catalyst has a molar ratio for silica/metal oxide of 10 to 50.

7. The dual catalyst system of claim 1 where the metal oxide of the mesoporous silica catalyst is tungsten oxide (WO_3).

8. The dual catalyst system of claim 1 where the MFI structured silica catalyst is alumina free.

9. The dual catalyst system of claim 1 where the MFI structured silica catalyst comprises alumina.

10. The dual catalyst system of claim 9 where the MFI structured silica catalyst has a molar ratio of silica to alumina of 200 to 3000.

11. The dual catalyst system of claim 1 where the MFI structured silica catalyst is free of acidity modifiers selected from the group consisting of rare earth modifiers, phosphorus modifiers, potassium modifiers, and combinations thereof.