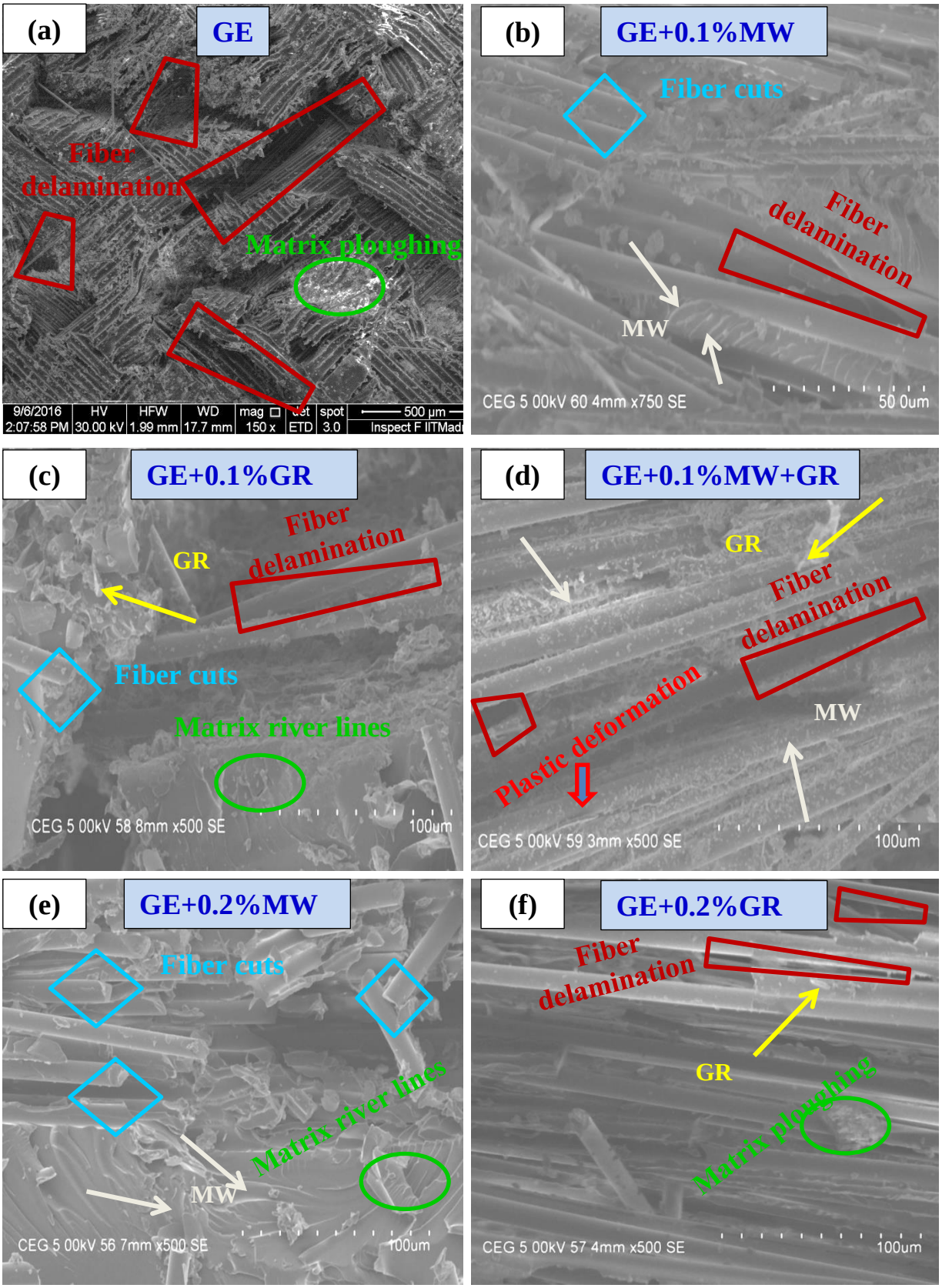
Flexural failure

Cross-ply



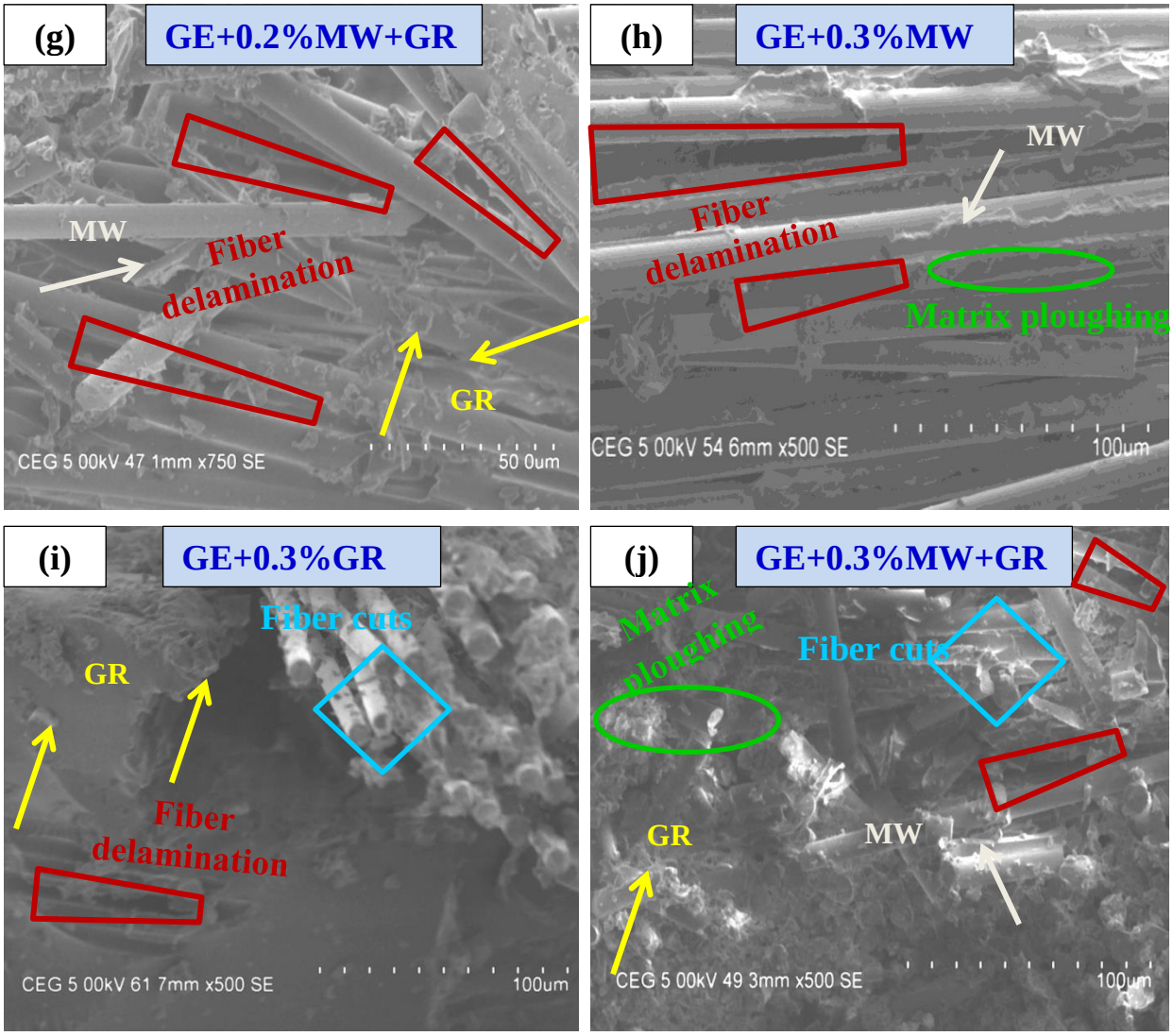
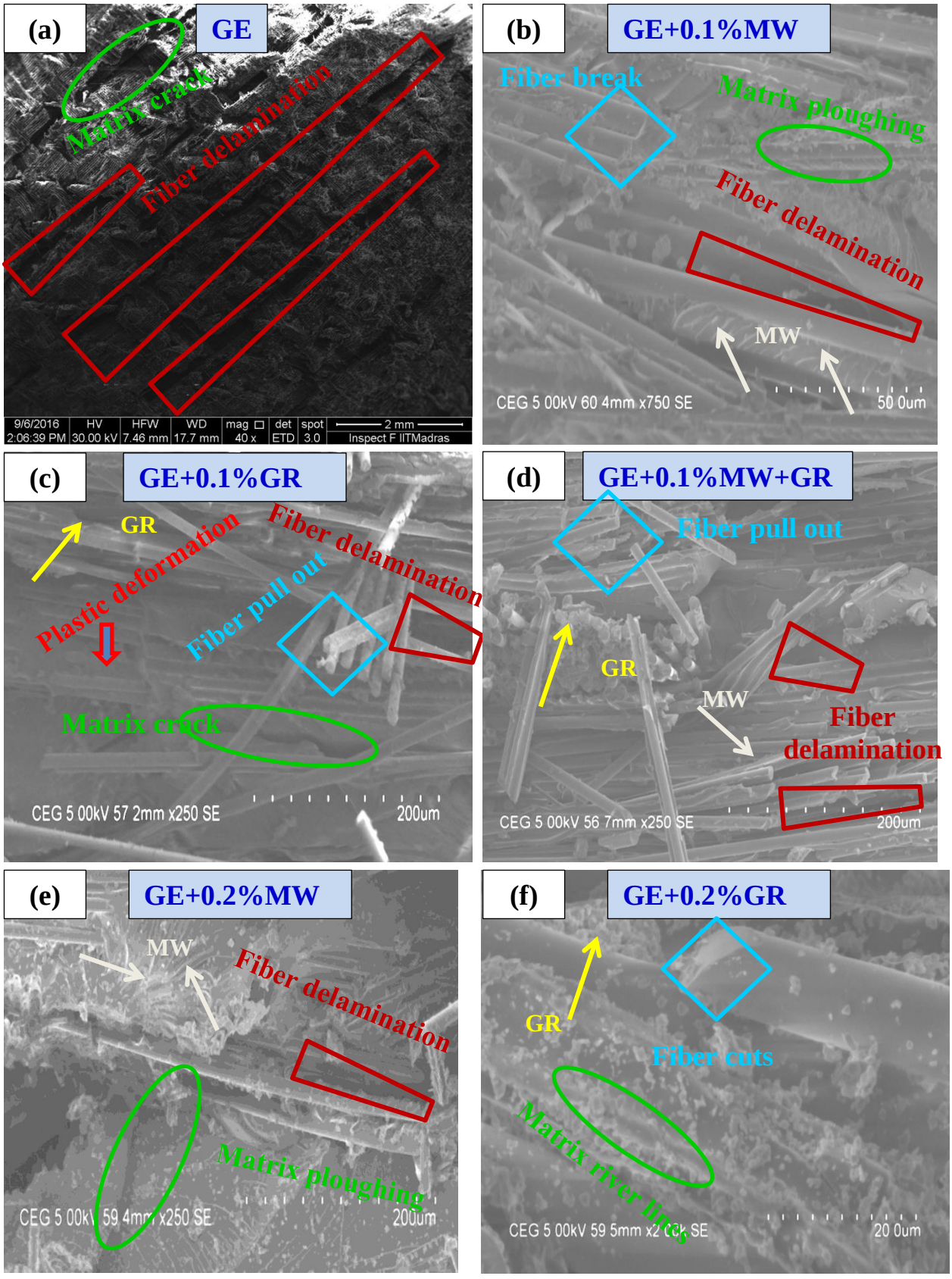


Figure S1. Flexural failure of GE and its nanocomposites (CP).

Angle-ply


(a)
GE
Matrix crack
Fiber delamination
9/6/2016 2:06:39 PM | HV 30.00 kV | HFW 7.46 mm | WD 17.7 mm | mag 40 x | det ETD | spot 3.0 | 2 mm | Inspect F IITMadras
(b)
GE+0.1%MW
Fiber break
Matrix ploughing
Fiber delamination
MW
CEG 5 00kV 60 4mm x750 SE
50 0um
(c)
GE+0.1%GR
GR
Plastic deformation
Fiber delamination
Fiber pull out
Matrix crack
CEG 5 00kV 57 2mm x250 SE
200um
(d)
GE+0.1%MW+GR
Fiber pull out
GR
MW
Fiber delamination
CEG 5 00kV 56 7mm x250 SE
200um
(e)
GE+0.2%MW
MW
Fiber delamination
Matrix ploughing
CEG 5 00kV 59 4mm x250 SE
200um
(f)
GE+0.2%GR
GR
Fiber cuts
Matrix river lines
CEG 5 00kV 59 5mm x2 SE
20 0um

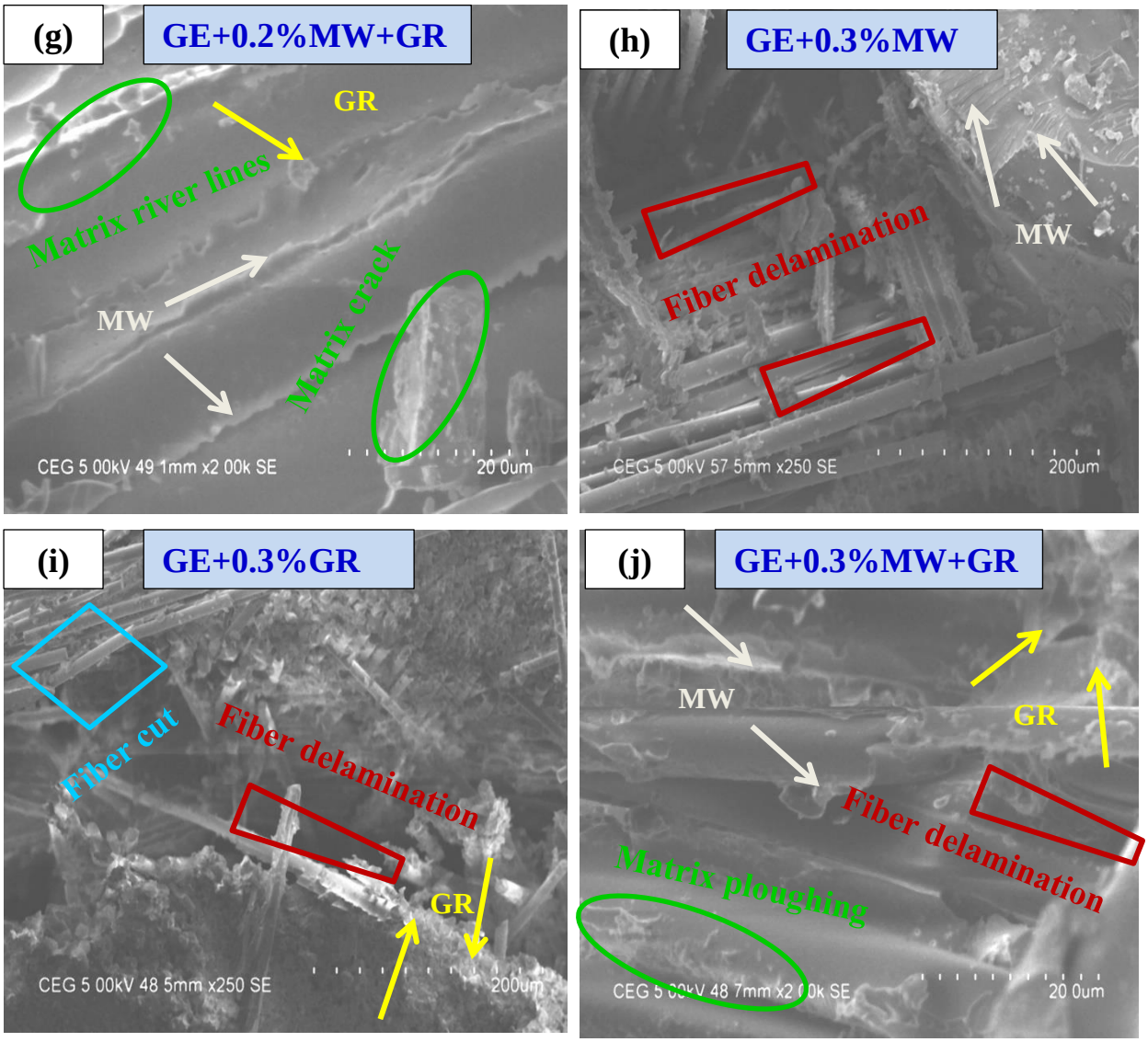
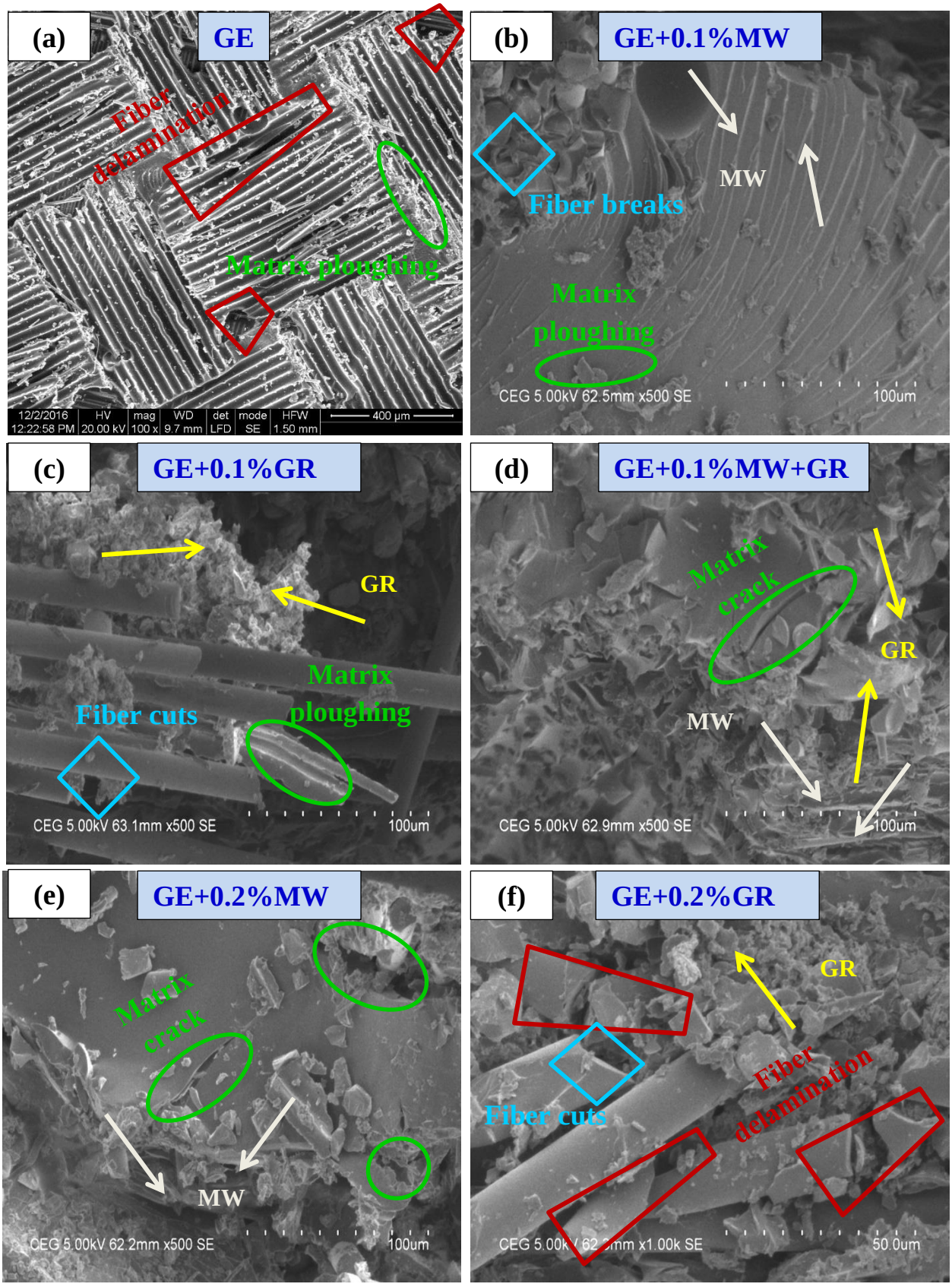


Figure S2. Flexural failure of GE and its nanocomposites (AP).

ILSS Failure

Cross-ply



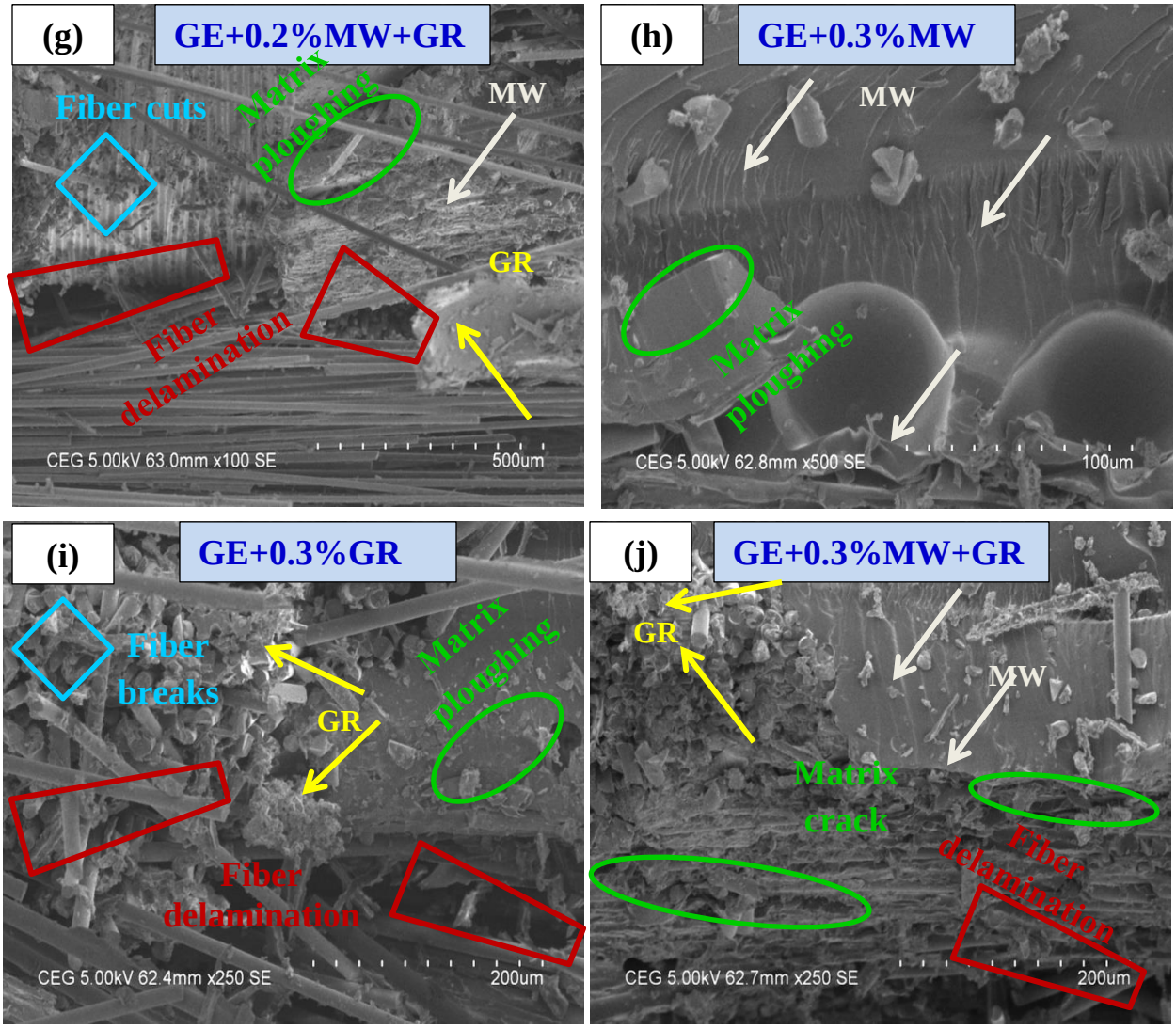
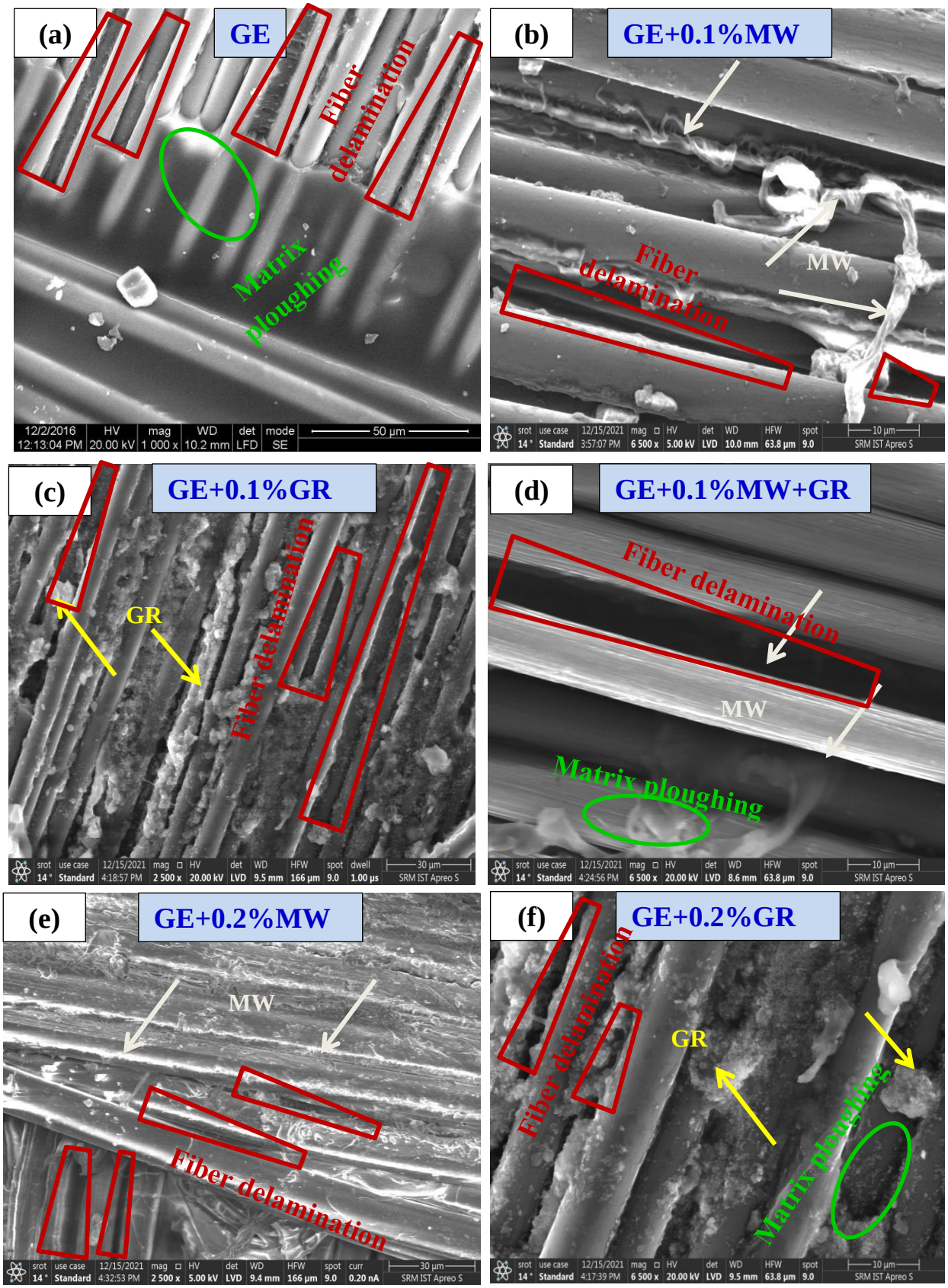


Figure S3. Interlaminar shear failure of GE and its nanocomposites (CP).

Angle-ply


(a)
GE
Fiber delamination
Matrix ploughing
(b)
GE+0.1%MW
Fiber delamination
MW
(c)
GE+0.1%GR
GR
Fiber delamination
(d)
GE+0.1%MW+GR
Fiber delamination
MW
Matrix ploughing
(e)
GE+0.2%MW
MW
Fiber delamination
(f)
GE+0.2%GR
Fiber delamination
GR
Matrix ploughing

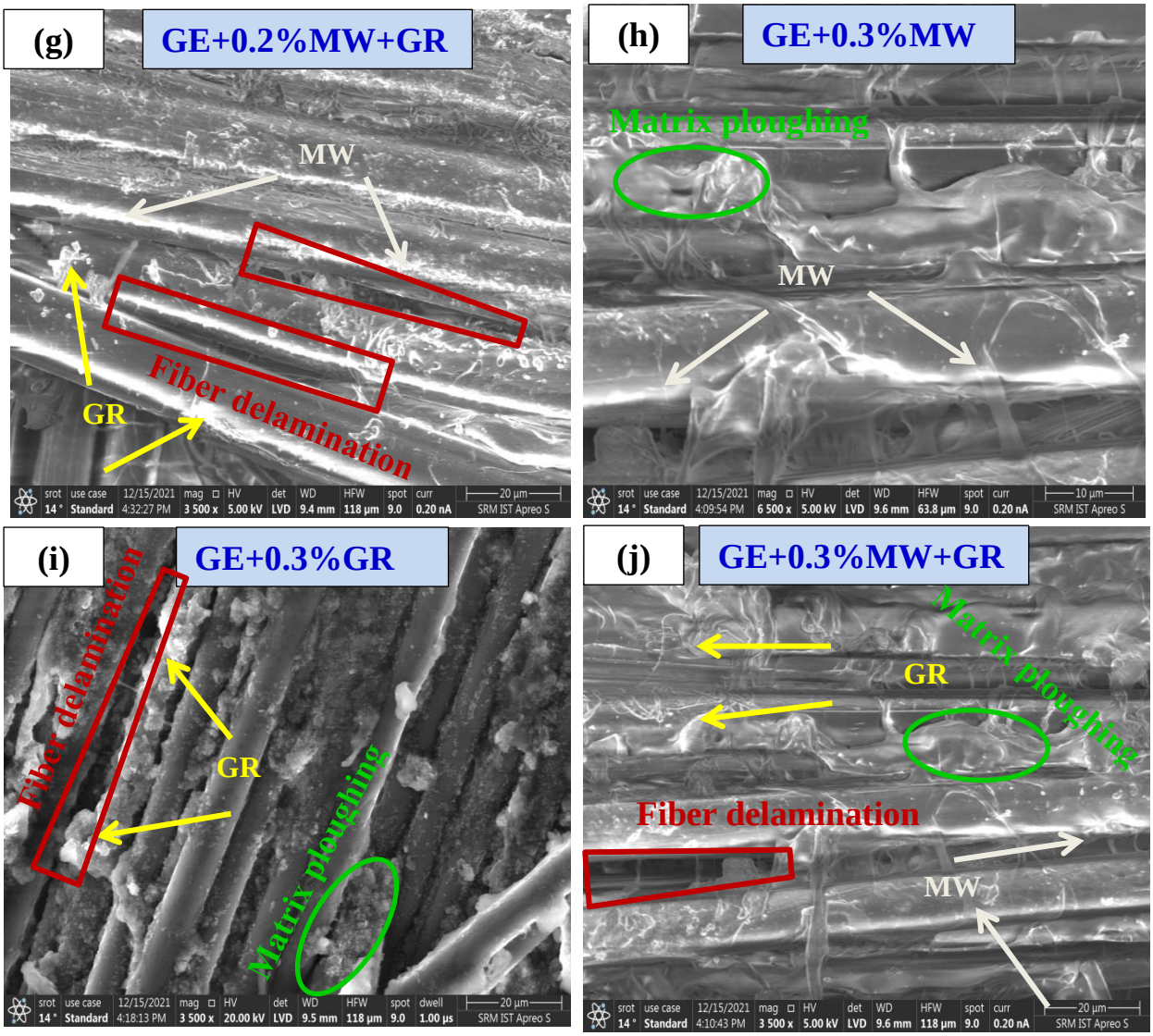


Figure S4. Interlaminar shear failure of GE and its nanocomposites (AP).